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Department of
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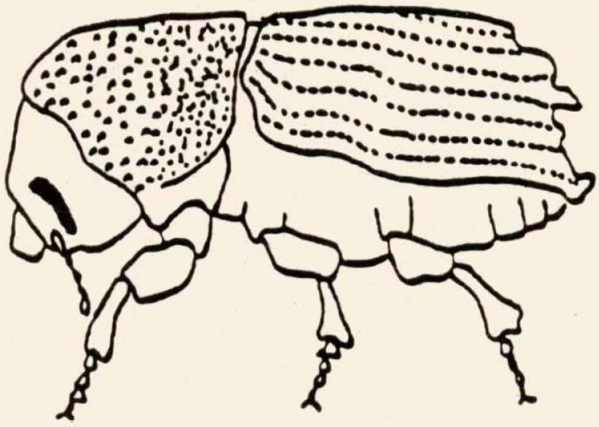
Forest Service

Northern Region

**Forest Pest
Management**

BARK BEETLE CONDITIONS
NORTHERN REGION
1990



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BARK BEETLE CONDITIONS
NORTHERN REGION
1990

INTRODUCTION

This is the fourth general report on the status of bark beetle conditions and the impacts bark beetles are having on stands throughout the Northern Region. Aerial surveys, conducted annually, provide the majority of the data included. Ground evaluations are conducted each year in infested stands, using the current year's aerial survey maps, to further determine population trend and measure damage which has occurred or may yet take place. The number of stands that can be visited on the ground is limited to late summer and fall of each year--after aerial surveys have been completed and until weather conditions restrict efficient surveying. For that reason, conditions in areas not ground surveyed may differ in levels of infestation from those reported. However, we try to sample stands scattered throughout infestations in each reporting area. This allows confidence in predicting declining or increasing beetle population and damage trends.

MOUNTAIN PINE BEETLE

Although mountain pine beetle (MPB) remained the most important insect killer of coniferous tree species in the Northern Region in 1990, the infested area continued a marked decline that began in 1982. Total acres on which beetle-caused mortality occurred declined by more than half in 1990--to just under 200,000 acres (Tables 1 and 2).

In northern Idaho, only 572 acres of lodgepole pine stands were infested. Mountain pine beetle populations have declined to endemic levels on the Nez Perce National Forest (NF) and Idaho Panhandle National Forests (IPNFs). These areas have minor amounts of reported lodgepole pine faders. In Montana, infested lodgepole pine stands totalled slightly more than 183,000 acres. The bulk of the infestation remains in the northwest portion of the State. There, some stands on the Kootenai, Flathead, and Lolo NFs, and Flathead Indian Reservation (IR) continue to harbor serious outbreaks. Other areas of beetle-caused mortality are on the Deerlodge NF and Stillwater and Thompson River State Forests (SF). All infested areas, however, are significantly less than noted in 1989. Though a few areas of active beetle populations remain, we anticipate a continuing declining trend in 1991 through host depletion and management activities.

Beetle-caused mortality in ponderosa pine Regionwide was 162 acres in Idaho and 11,623 acres in Montana. Most of the mortality in Idaho was scattered over the Clearwater/Potlatch Fire Protection District (FPD). The Bitterroot NF reporting area contained the most damage in Montana, with just under 4,600 acres reported on all ownerships. The Kootenai, Lolo, and Lewis and Clark NFs also had active outbreaks.

Except for the Kootenai and Flathead NFs, MPB damage to western white pine stands remained light and widely scattered throughout the Region.

Only a small amount of whitebark pine mortality was observed as beetle caused in 1990.

Beaverhead National Forest

In 1990, MPB mortality to lodgepole pine stands remained at an endemic level, with only 139 infested acres observed (Tables 1 and 2). Most of the small, 1- to 5-tree groups, occurred in two areas--east of Sheridan and around the Grasshopper Creek drainage northwest of Dillon.

Table 1.--Acres under Federal jurisdiction in the Northern Region on which mountain pine beetle-caused mortality was aerially observed, 1989 and 1990.

	- - - 1989 - - -				- - - 1990 - - -			
Area	LPP[1]	PP	WBP	WWP	LPP	PP	WBP	WWP
Beaverhead NF	417	-	8	-	124	-	2	-
Bitterroot NF	59	3,397	-	-	14	1,505	-	-
Clearwater NF	-	264	-	-	-	-	-	4
Custer NF	13	18	-	-	-	44	18	-
Deerlodge NF	2,472	56	63	-	852	-	2	-
Flathead NF	57,375	19	799	254	8,157	14	109	2,124
Gallatin NF	89	-	-	-	*	*	*	*
Helena NF	5	8	78	-	112	34	2	-
IPNF's	500	110	1	3	78	33	2	34
Kootenai	248,033	10,636	327	484	132,858	1,770	105	1,392
Lewis & Clark NF	46	98	-	-	8	810	-	-
Lolo NF	26,698	2,607	634	2	21,590	1,014	-	43
Nez Perce NF	803	-	-	-	266	6	86	4
Total NF	**336,510**	**17,213**	**1,910**	**743**	**164,059**	**5,234**	**326**	**3,601**
Glacier NP	1,085	-	-	52	*	*	*	*
Yellowstone NP	*	*	*	*	*	*	*	*
Blackfeet IR	*	*	*	*	*	*	*	*
Crow IR	-	1,228	-	-	-	216	-	-
Flathead IR	905	533	-	-	1,194	334	2	-
Ft. Belknap IR	-	1	-	-	*	*	*	*
N. Cheyenne IR	-	-	-	-	-	-	-	-
Rocky Boy's IR	4	1	-	-	4	26	-	-
BLM (Total)	77	96	3	1	22	46	2	-
Total (Non-NF)	**2,071**	**1,879**	**3**	**1**	**1,220**	**622**	**4**	-
Total Federal	**338,581**	**19,092**	**1,913**	**744**	**165,279**	**5,856**	**330**	**3,601**

[1] LPP = Lodgepole pine, PP = ponderosa pine; WBP = whitebark pine; WWP = western white pine
* Not flown

Table 2.--Acres of State and private ownership (within the following reporting areas) in the Northern Region on which mountain pine beetle-caused mortality was aerially observed, 1988 and 1989.

	- - - 1989 - - -				- - - 1990 - - -			
Area	LPP[1]	PP	WBP	WWP	LPP	PP	WBP	WWP
Beaverhead NF	152	1	2	-	11	-	-	-
Bitterroot NF	2	8,849	-	-	-	3,092	-	-
Clearwater NF	-	-	-	-	-	-	-	2
Custer NF	1	-	-	-	-	2	-	-
Deerlodge NF	35	4	-	-	-	-	-	-
Flathead NF	4,429	42	-	60	928	60	2	129
Gallatin NF	80	-	1	-	*	*	*	*
Helena NF	41	165	-	-	76	112	-	-
IPNF's	1	-	-	-	-	2	-	-
Kootenai NF	17,608	1,860	-	7	8,981	439	-	22
Lewis & Clark NF	6	722	-	-	23	78	-	-
Lolo NF	5,356	1,237	-	-	2,561	1,185	-	-
Nez Perce NF	10	-	-	-	4	-	-	-
Stillwater SF	18,137	1	-	5	4,415	-	-	172
Swan River SF	-	-	-	2	8	2	-	50
Thompson River SF	3,181	314	-	-	1,004	115	-	-
Garnets	1	551	-	-	12	723	-	-
Cataldo FPD	75	1	-	-	35	-	-	-
CLW/Potlatch FPD	-	-	-	1	17	113	-	-
Pend Orielle SF	1	932	-	-	-	4	-	-
Mica FPD	21	-	-	-	-	-	-	-
W. St. Joe FPD	-	-	-	-	-	-	-	-
Craig Mountains	7,258	4,970	-	-	16	-	-	-
Maggie Creek FPD	-	-	-	135	154	-	-	-
Total	**56,395**	**19,649**	**3**	**210**	**18,245**	**5,927**	**2**	**375**

[1] LPP = Lodgepole pine, PP = ponderosa pine; WBP = whitebark pine; WWP = western white pine
* Not flown

Bitterroot National Forest

Total infested acres in ponderosa pine stands on all ownerships declined significantly within the Bitterroot NF reporting area in 1990 (Tables 1 and 2). Private lands on the west side of the Bitterroot Valley from Florence south to Sula, contained most of the MPB-caused mortality (Appendix, Figure 1). Ground evaluations from the French Basin and Grouse Butte outbreaks, near Darby, show average number of trees killed per acre down to 22 in 1990 from 41 in 1989 (Table 3).

Table 3.--Acres infested and trees per acre killed by mountain pine beetle, Bitterroot reporting area, 1989 and 1990.

	- - - Acres infested [1] - - -			- - - Average no. trees/acre killed[2] - - -			
Ownership	Host	1989	1990	Older	1989	1990	To date
Darby RD	LPP	42	2	-	-	-	-
	PP	2,357	1,034	38.8	20.4	1.9	61.1
Stevensville RD	LPP	0	0	-	-	-	-
	PP	24	11	-	-	-	-
Sula RD	LPP	0	6	-	-	-	-
	PP	925	388	14.1	76.9	74.7	165.7
West Fork RD	LPP	17	6	-	-	-	-
	PP	91	72	-	-	-	-
State, private, other	LPP	2	0	-	-	-	-
	PP	8,849	3,092	66.6	47.2	9.2	123.0
Total/weighted average		12,307	4,611	39.6	41.2	21.9	102.7

[1] Aerial survey estimates
[2] Ground survey data (averaged from number of stands visited)

Custer National Forest

The Pryor Mountains, southeast of Bridger, contain four scattered groups of whitebark pine reported killed by MPB.

On the Ashland Ranger District (RD), 23 groups of fading ponderosa pine--totaling 102 trees-- were observed east of Ashland (Tables 1 and 2). Though these were aerially recorded as MPB-killed, ground checking in two areas--Camps Pass and the Whitetail area--found only pine engraver beetles (*Ips pini*). It is probable that other areas recorded as MPB are also pine engraver.

Deerlodge National Forest

In 1990, a continued marked decline in MPB-infested lodgepole pine acres was noted within the Deerlodge NF reporting area (Tables 1 and 2), although two areas--the Butte RD and other ownerships--recorded scattered, slight increases (Table 4). Most affected areas continue to be in stands north of Homestake Pass (Appendix, Figure 2).

Table 4.--Acres of lodgepole pine infested and trees per acre killed by mountain pine beetle, Deerlodge reporting area, 1989 and 1990.

	- - - Acres infested - - -		- - - Average no. trees/acre killed - - -			
Ownership	1989	1990	Older	1988	1989	To date
Butte RD	17	70	-	-	-	-
Deerlodge RD	75	24	-	-	-	-
Jefferson RD	2,378	758	17.4	5.1	0.7	23.2
Philipsburg RD	2	0	-	-	-	-
State, private, other	39	158	-	-	-	-
Total/weighted avg.	2,511	1,010	17.4	5.1	0.7	23.2

Flathead National Forest

A huge drop in infested acreage--all ownerships, all species--from 63,000 in 1989 to 9,000 in 1990, emphasizes the rapid decline of the mountain pine beetle (Appendix, Figure 3). A noteable exception is an increase in western white pine mortality (Table 5). Although no ground data were taken in western white pine areas in 1990, ground observations in 1989 along Hungry Horse Reservoir, Hungry Horse RD, and the southern portion of Glacier View RD suggested other than MPB. A large number of trees recorded as MPB-killed, were in fact faders that had suffered winter damage in February 1989 and also had heavy blister rust infections. Some MPB damage was also found at that time. The increase in western white pine damage observed in 1990 may be more an indication of disease and abiotic damage than MPB-caused mortality.

Although a few isolated "hot spots" of infested lodgepole pine stands had slight increases in damage in 1990, overall ground data show a decline to 17 trees per acre successfully attacked in 1990, against 24 trees per acre killed in 1989 (Table 5). Host depletion and stand management activities have reduced beetle damage in lodgepole pine stands and will continue this trend.

Helena National Forest

Mountain pine beetle populations increased slightly on Federal and surrounding lands in 1990 (Tables 1 and 2). Many small--1- to 10-tree groups--in lodgepole and ponderosa pine stands are widely scattered on the west side of the reporting area, from Lincoln southeast to Helena. This could be the start of an outbreak related to winter damage and drought from recent years, or a short-lived occurrence. We will monitor it closely in 1991. The once-large infestation in lodgepole pine stands east of Townsend has all but ended.

Idaho Panhandle National Forests

Except for a modest increase in MPB-killed western white pine, acreage of other infested pine species declined in 1990 (Table 6). Boulder Creek drainage, Bonners Ferry RD, once contained the largest MPB infestation on the IPNFs. Observed 1990 mortality, in lodgepole pine stands, was one-third that of 1989.

Table 5.--Acres of host infested and lodgepole pine per acre killed by mountain pine beetle, Flathead reporting area, 1989 and 1990.

		- - - Acres infested - - -		- - - Average no. trees/acre killed - - -			
Ownership	Host	1989	1990	Older	1989	1990	To date
Glacier View RD	LPP	19,608	2,367	47.8	30.6	12.4	90.8
	PP	16	2	-	-	-	-
	WBP	793	83	-	-	-	-
	WWP	42	687	-	-	-	-
Hungry Horse RD	LPP	8,917	1,476	53.1	24.1	20.3	97.5
	PP	0	0	-	-	-	-
	WBP	6	6	-	-	-	-
	WWP	197	1,049	-	-	-	-
Spotted Bear RD	LPP	156	79	-	-	-	-
	WBP	0	20	-	-	-	-
	WWP	3	77	-	-	-	-
Swan Lake RD	LPP	4,526	1,297	12.3	32.5	36.7	81.5
	PP	2	12	-	-	-	-
	WBP	0	0	-	-	-	-
	WWP	12	311	-	-	-	-
Tally Lake RD	LPP	24,708	2,938	134.8	3.5	0	138.3
	PP	1	0	-	-	-	-
	WWP	0	0	-	-	-	-
State, private, other	LPP	4,429	928	-	-	-	-
	PP	42	60	-	-	-	-
	WBP	0	2	-	-	-	-
	WWP	61	129	-	-	-	-
Total/weighted avg. (LPP)		62,979	9,085	59.7	23.6	17.1	100.4

Looked at two areas of WWP on Glacier View.- mostly McGinnis Creek. Lower end quite a few new attacks-- more 91's than 90's. Upper end, few new attacks-- more 90's and older dead.

Table 6.--Acres infested by mountain pine beetle, Idaho Panhandle NFs reporting area, 1989 and 1990.

	- - - 1989 - - -				- - - 1990 - - -			
Ownership	WBP	LPP	PP	WWP	WBP	LPP	PP	WWP
Avery RD	0	4	1	0	0	0	0	2
Bonners Ferry RD	0	177	0	0	2	59	15	14
Fernan RD	0	120	2	2	0	14	0	2
Priest Lake RD	0	0	50	0	0	0	6	10
Sandpoint RD	1	9	57	1	0	3	12	2
St. Maries RD	0	0	0	0	0	0	0	0
Wallace RD	0	190	0	0	0	2	0	4
State, private, other	0	1	0	0	0	0	2	0
Total	1	501	110	3	2	78	35	34

Kootenai National Forest

Though the Kootenai NF reporting area contains our most active MBP infestations, observed infested acreage of all pine species dropped from 279,000 in 1989 to 146,000 in 1990 (Appendix, Figure 4).

Rexford RD and the neighboring upper Yaak River drainage--Three Rivers RD--have the most active beetle-caused mortality in lodgepole pine stands. Ground-plot data collected in these locations show the highest rate of 1990 damage compared to 1989, though at generally static to decreasing trends. Ground data from Fortine and Libby RDs show substantial decreases in mortality. Forest-wide trees killed per acre declined to 23 in 1990, from 40 trees killed per acre in 1989 (Table 7). Mountain pine beetle populations in lodgepole pine stands should continue to decline Forestwide in 1991.

Ponderosa pine stands infested by MPB also recorded substantial reductions on all ownerships (Table 7). This should continue in 1991.

Lewis and Clark National Forest

Acres observed having MPB-damaged ponderosa pine stands on Forest lands in 1990 increased to 810--a 900 percent increase since 1989--(Table 8). Most of the increase occurred on the Judith RD, between Woodchopper Ridge and Lost Fork Judith River. A ground evaluation of this area will be conducted in 1991 to determine the status of this outbreak. Bureau of Land Management, State, and private lands surrounding the Forest experienced a decrease in beetle-caused mortality in ponderosa pine.

Table 7.--Acres infested and trees per acre killed by mountain pine beetle, Kootenai reporting area, 1989 and 1990.

	- - - Acres infested - - -			- - - Average no. trees/acre killed - - -			
Ownership	Host	1989	1990	Older	1989	1990	To date
Cabinet RD	LPP	445	731	-	-	-	-
	PP	13	2	-	-	-	-
	WBP	1	0	-	-	-	-
	WWP	1	30	-	-	-	-
Fisher River RD	LPP	20,845	1,257	-	-	-	-
	PP	4,870	572	-	-	-	-
	WWP	17	14	-	-	-	-
Fortine RD	LPP	62,579	13,169	47.4	38.0	1.9	87.3
	PP	469	242	-	-	-	-
	WBP	174	78	-	-	-	-
	WWP	395	43	-	-	-	-
Libby RD	LPP	30,004	12,341	44.9	26.6	8.1	79.6
	PP	2,628	735	-	-	-	-
	WBP	27	27	-	-	-	-
	WWP	12	584	-	-	-	-
Rexford RD	LPP	111,910	86,502	49.4	47.9	41.4	138.7
	PP	2,604	215	-	-	-	-
	WWP	20	195	-	-	-	-
Three Rivers RD (Troy)	LPP	6,291	4,822	-	-	-	-
	PP		51	4	-	-	-
	WBP	125	0	-	-	-	-
	WWF	31	356	-	-	-	-
Three Rivers RD (Yaak)	LPP	15,959	14,036	39.5	0	7.5	47.0
	PP	1	0	-	-	-	-
	WWP	8	170	-	-	-	-
State, private, other	LPP	17,608	8,981	-	-	-	-
	PP	1,860	439	-	-	-	-
	WWP	7	22	-	-	-	-
Total/weighted avg.	LPP	265,641	141,839	47.8	40.0	22.7	110.5
	PP	12,496	2,209	-	-	-	-
Species total		278,137	145,567				

Table 8.--Acres infested by mountain pine beetle Lewis & Clark reporting area, 1989 and 1990.

	- - - 1989 - - -		- - - 1990 - - -	
Ownership	LPP	PP	LPP	PP
Judith RD	39	59	6	810
Kings Hill RD	4	23	2	0
Musselshell RD	3	16	0	0
BLM	2	86	2	10
State & private	6	722	23	78
Total	54	906	33	898

Lolo National Forest

The Lolo NF reporting area, though containing the second most active MPB infestation, still recorded a 25 percent decrease in infested acres--from 36,000 in 1989 to 27,000 last year (Appendix, Figures 5 and 6).

In lodgepole pine stands, an increase in infested acreage was noted on the Superior RD, while Ninemile and Plains/Thompson Falls RDs had decreases in amount of damage. Surrounding State and private lands had similar reductions (Table 9).

Except for Superior RD which showed a large decline, ponderosa-pine-infested acreage remained at a static level in 1990 throughout the reporting area (Table 9).

Ground-survey data showed a slight increase in 1990 attacks in lodgepole pine stands--but a substantial decrease in ponderosa pine stands (Table 9). Mountain pine beetle population levels should remain static or decline in most areas in 1991.

Last year, a pilot project to test the effectiveness of verbenone (MPB anti-aggregative pheromone) was conducted on the Plains/Thompson Falls RD, in the Little Thompson River drainage. We had hoped to protect susceptible lodgepole pine stands from beetle attack by aerially applying verbenone in small polymer beads. Four concentrations of verbenone, in two separate formulations, were compared with untreated stands. Fall evaluations showed no treatment effect. A report detailing project results is in preparation.

Table 9.--Acres infested and trees per acre killed by mountain pine beetle, Lolo reporting area, 1989 and 1990.

	- - - Acres infested - - -			- - - Average no. trees/acre killed - - -			
Ownership	Host	1989	1990	Older	1989	1990	To date
Missoula RD	LPP	3	16	-	-	-	-
	PP	50	6	-	-	-	-
	WBP	0	0	-	-	-	-
Ninemile RD	LPP	1,727	901	17.1	12.1	13.4	42.6
	PP	438	589	36.4	25.9	9.0	70.8
	WWP	0	0	-	-	-	-
Plains RD	LPP	19,822	16,096	49.4	23.9	45.5	118.8
	PP	229	225	-	-	-	-
	WBP	634	0	-	-	-	-
	WWP	0	0	-	-	-	-
Seeley Lake RD	LPP	0	2	3.0	26.8	27.0	56.8
	PP	1	2	-	-	-	-
	WBP	0	0	-	-	-	-
Superior RD	LPP	576	1,096	31.4	25.4	11.6	68.4
	PP	1,833	174	35.5	2.9	0	38.4
	WBP	0	0	-	-	-	-
	WWP	1	41	-	-	-	-
Thompson Falls RD	LPP	4,570	3,479	-	-	-	-
	PP	56	18	-	-	-	-
	WBP	0	0	-	-	-	-
	WWP	1	2	-	-	-	-
Garnet Mtns.	LPP	2	12	-	-	-	-
	PP	554	731	4.7	73.7	29.3	107.7
State, private, other	LPP	5,356	2,561	40.2	17.9	9.2	67.3
	PP	1,237	1,187	50.7	9.5	0	60.2
	WBP	0	0	-	-	-	-
	WWP	0	0	-	-	-	-
Total/weighted avg.	LPP	32,056	24,163	31.9	19.2	25.1	76.2
	PP	4,398	2,932	29.3	33.7	12.2	75.2
Species total		36,454	27,095	-	-	-	-

Nez Perce National Forest

The decline of the MPB infestation on the Nez Perce NF continued in 1990, with only 362 acres recorded--mainly in lodgepole pine stands on Red River RD (Appendix, Figure 7). An 86-acre group of whitebark pine faders, observed near John Day Mountain, Salmon River RD, is probably a continuation of a 303-acre group that was last recorded on aerial survey maps in 1987. It was evidently missed in 1988 and 1989.

Data collected from two ponderosa pine stands on the Clearwater RD, confirmed a declining beetle population (Table 10). Aggressive stand management and depletion of susceptible host have contributed to the marked decline in MPB-caused mortality the last 2 years.

Table 10.--Acres infested and trees per acre killed by mountain pine beetle, Nez Perce reporting area, 1989 and 1990.

	- - - Acres infested - - -			- - - Average no. trees/acre killed - - -			
Ownership	Host	1989	1990	Older	1989	1990	To date
Clearwater RD	PP	0	2	2.8	14.1	4.7	21.6
Elk City RD	LPP WWP	3 0	8 2	- -	- -	- -	- -
Red River RD	LPP	800	258	-	-	-	-
Salmon River RD	WBP WWP	0 0	86 2	- -	- -	- -	- -
Selway RD	PP	0	4	-	-	-	-
State, private, other	LPP	10	4	-	-	-	-
Total/weighted avg.	LPP	813	270	2.8	14.1	4.7	21.6
Species total		813	366	-	-	-	-

Montana Indian Reservations

The Crow IR had the only significant beetle-caused mortality in ponderosa pine stands in eastern Montana. There, only 216 acres were observed in 1990, down from 1,228 acres in 1989 (Table 1; Appendix, Figure 8).

On the Flathead IR in western Montana, a slight increase in infested lodgepole pine acres was recorded. A slight decrease occurred in ponderosa pine acreage (Table 1). The major outbreak that occurred in the northwest corner near Bassoo Peak, now contains only a few small, scattered groups of lodgepole pine faders. Most active mortality is occurring along the southwestern corner between Hot Springs and Rainbow Lake (Appendix, Figure 9). Ground evaluations recorded an increase in new attacks--to 49 per acre in 1990, from 8 per acre in 1989 (Table 11). However, these are considered to be isolated "hot spots," and the infestation should decline.

Table 11.--Acres infested and trees per acre killed by mountain pine beetle, Flathead Indian Reservation, 1988 and 1989.

	- - - Acres infested - - -		- - - Average no. trees/acre killed - - -			
Host	1989	1990	Older	1989	1990	To date
LPP	905	1,194	13.5	7.6	48.9	70.0
PP	553	334	-	-	-	-
WBP	0	2	-	-	-	-
WWP	0	0	-	-	-	-
Total	1,458	1,530	13.5	7.6	48.9	70.0

Stillwater, Swan River, and Thompson River State Forests (Montana)

The once-major MPB outbreaks in lodgepole pine stands on the Stillwater and Thompson River SFs continued to decline last year. Infested acreage on the Stillwater State Forests decreased from 18,100 in 1989, to 4,400 in 1990 (Table 2). Information from ground surveys in the Stillwater River drainage--where the infestation is most active--confirm this decline. Twenty-three new attacks per acre last year compared to 44 attacks per acre in 1989 (Appendix, Figure 3).

Mortality in lodgepole and ponderosa pine stands on the Thompson River SF in 1990 was one-third of the previous year's--1,100 acres versus 3,500 acres (Table 2). Damage is equally divided between State and private lands throughout the Forest. Most occurs between Loneman Creek and Buffalo Bill Creek--10 miles north of Plains (Appendix, Figure 5).

A slight increase in beetle-caused mortality in western white pine was observed on the Swan River SF along the west side of the Swan Valley. Ten acres of scattered damage in lodgepole and ponderosa pines were noted (Table 2).

Craig Mountains (Idaho)

After more than a decade of heavy MPB-caused mortality in lodgepole and ponderosa pine stands, only 16 acres of lodgepole pine faders were recorded from aerial surveys in 1990 (Table 2). Host depletion and intensive logging over the decade have combined to end the outbreak in the area.

Cataldo, Clearwater/Potlatch, Mica, Maggie Creek and West St. Joe Fire Protection Districts and Pend Oreille State Forest (Idaho)

Except for 154 acres with 250 lodgepole pine faders east of Kamiah on the Maggie Creek FPD and 113 acres with 100 fading ponderosa pine west of Weippe on the Clearwater/Potlatch FPD, very little MPB-caused mortality was observed in these reporting areas in 1990 (Table 2).

DOUGLAS-FIR BEETLE

Due to near-normal precipitation and increased sanitation/salvage, total area affected by Douglas-fir beetle (DFB) declined for the third consecutive year in 1990 to 7,189 acres (Table 12; Appendix, Figure 17). Data collected from 58 ground evaluation plots distributed throughout infested stands confirmed declining beetle populations. An exception was noted on some stands evaluated on the Bitterroot and Lolo NFs where we observed an increase in trees killed and parent-to-brood ratios greater than 1:1 (Table 13). A further sign of declining DFB was the large number of trees that had been attacked for 2 consecutive years throughout the Region.

In northern Idaho, endemic conditions now seem to be the norm (Appendix, Figures 12, 13, 14, 15, and 16). Because of concerns raised by extensive DFB mortality along the St. Joe River drainage, Avery RD, IPNFs, intensive ground evaluations were conducted. Data collected from 16 areas verified the continuing decline in beetle-caused damage. Trees killed per surveyed "beetle group" declined from an average of 22 in 1989, to 9 in 1990 (Table 13). Though parent-to-brood ratios were 1:2--and would normally indicate an increasing population--we don't consider this to be the case. Because numerous trees were attacked in both 1989 and 1990, and many of these, and other attacked trees, contained brood only in the lower bole, few beetles will emerge in 1991. Surrounding stands should be less threatened in the immediate future.

Since 1988, the large outbreak on the Beaverhead NF, Dillon RD, in the Willow Creek area has continued to decline. Only 3,000 acres were aerially observed in 1990. Ground observations and evaluations in spring and fall of 1990 determined that most fader trees were killed in or before 1988. However, one local active group was along Birch Creek where the parent-to-brood ratio was 1:7. Here again, DFB were filling in the bases of trees top killed in 1989 by secondary bark beetles.

On the Bitterroot NF, stands in the East and West Forks of the Bitterroot River drainages contained the most active DFB populations in the Region (Appendix, Figure 10). Aerial surveys recorded increases in acres infested and trees killed in 1990. Ground evaluations give a different outlook--with static to decreasing numbers of both acres and trees. The apparent discrepancy in aerial versus ground observations can be attributed to the quite difficult task of determining year of beetle attack and, therefore, the year tree faded, from the air.

Two of eight areas evaluated--Prospect/Cooper Creeks and West Fork Thompson River--both on the Plains/Thompson Falls RD, Lolo NF, showed increased beetle populations (Appendix, Figure 11). Overall, the Forest has a significantly declining infestation trend (Table 13).

Four other ground evaluations from the Kootenai and Flathead NFs and Swan River SF all indicated declining populations.

Table 12.--Acres infested and mortality attributed to Douglas-fir beetle in the Northern Region by reporting area, 1989 and 1990.

	- - - 1989 - - -			- - - 1990 - - -		
Reporting area	Acres	Trees	Vol. (MBF)	Acres	Trees	Vol. (MBF)
Beaverhead NF	5,180	3,528	705.6	3,012	2,561	512.2
Bitterroot NF	230	1,243	372.9	2,769	2,920	876.0
Clearwater NF	1,686	7,014	2,454.9	966	5,075	1,776.3
Custer NF	2	15	3.0	4	9	1.8
Deerlodge NF	22	11	2.2	45	38	7.6
Flathead NF	26	54	16.2	194	302	90.6
Gallatin NF	-	-	-	*	*	*
Idaho Panhandle NFs	10,917	42,218	14,776.3	3,584	15,089	5,281.2
Helena NF	1	10	2.0	12	18	3.6
Kootenai NF	102	440	132.0	1,240	991	297.3
Lewis & Clark NF	5	22	4.4	2	10	2.0
Lolo NF	712	2,944	883.2	1,546	1,446	433.8
Nez Perce NF	1,755	6,426	2,249.1	2,043	6,539	2,288.7
Swan River SF	-	-	-	127	140	42.0
Thompson River SF	7	83	24.9	8	10	3.0
Flathead IR	7	57	-	117	225	67.5
Nez Perce IR	70	210	73.5	13	65	22.8
Rocky Boy's IR	-	-	-	-	-	-
Cataldo FPD	244	775	271.2	111	495	173.3
CLW/Potlatch FPD	736	2,924	1,023.4	897	4,741	1,659.4
Kendrick FPD	5	50	17.5	104	460	161.0
Maggie Cr. FPD	33	320	112.0	92	407	142.5
Mica FPD	79	549	192.2	52	159	55.7
Pend Oreille FPD	212	1,288	450.8	35	165	57.8
Priest Lake FPD	3	45	15.7	58	260	91.0
W. St. Joe FPD	363	1,900	665.0	95	480	168.0
Craig Mtns.	573	481	168.4	14	105	36.8
Garnets (BLM)	1	9	2.7	49	130	39.0
Total	22,971	72,616	24,619.1	7,189	42,840	14,290.9

* Not flown

Table 13.--Average number of Douglas-fir attacked by Douglas-fir beetle, selected plots (58) throughout infested area in northern Idaho and western Montana, 1990.

Location	1989 Dead	1990 Successful attack	1990 Unsuccessful attack	Total Dead per plot	Trend
Beaverhead NF	3.2	4.6	1.6	7.8	Static to Decreasing
Bitterroot NF	10.4	9.1	1.6	19.5	Static
Clearwater NF	17.3	8.6	3.4	25.9	Decreasing
IPNFs (CDA)	27.3	2.8	1.7	30.1	Decreasing
IPNFs (Kaniksu)	9.5	6.0	5.0	15.5	Decreasing
IPNFs (St. Joe)	21.6	8.7	2.2	30.3	Decreasing
Lolo NF	24.6	7.5	5.5	32.1	Static to Decreasing
Nez Perce NF	20.3	3.3	1.0	23.6	Decreasing

WESTERN PINE BEETLE

While still significant, the area on which ponderosa pine were killed by WPB in northern Idaho, declined markedly in 1990. Fewer than 8,900 acres--compared to more than 19,000 acres in 1989--were infested. Approximately 46,000 faders were noted. Much of the infestation is on State and private lands in the Craig Mountains and Maggie Creek reporting areas. In western Montana, populations likewise declined significantly. Just over 350 dead trees on 600 acres were recorded (Appendix, Figure 18).

FIR ENGRAVER

Though acres infested by fir engraver--and corresponding tree mortality--remained high in 1990, the affected area decreased by nearly two-thirds from 1989 levels. In northern Idaho, more than 36,000 acres still contained some level of grand fir mortality attributable to the beetle. An approximate 53,000 faded trees were observed. In Montana, fir engraver populations remained essentially endemic. Less than 200 faders, on 650 acres, were recorded (Appendix, Figure 19).

PINE ENGRAVER

Populations of pine engraver beetles, and resultant tree killing, declined in Idaho in 1990. Only 550 ponderosa pines, on slightly more than 300 acres--mainly on the Priest Lake RD, IPNFs--were killed. The significant reduction in infested acres was likely a result of more moist conditions during 1990; but may have been associated with improved slash treatment at logging sites as well.

In Montana, because of continuing dry conditions in the eastern half of the State, ponderosa pine mortality caused by the beetle increased significantly. Outbreaks on the Helena and Custer NFs and Northern Cheyenne IR contain approximately 1,000 acres of ponderosa pine faders. Once again, inadequate slash disposal from logging activities contribute to continual brood sites, making surrounding standing trees highly susceptible to pine engraver beetles.

During 1991, two field experiments, using semiochemicals to reduce beetle-caused mortality, will be implemented in eastern Montana on the Ashland RD, Custer NF, and Northern Cheyenne IR. One will be a ground application of anti-aggregating pheromones (ipsenol and verbenone) in mixed pellet form to prevent beetles from successfully infesting ponderosa pine slash in recently thinned stands. The other is a mass-trapping effort using pheromone-baited funnel traps. By placing traps around green logging slash piles and in stands recently thinned, we hope to reduce numbers of new infestations by overwintered adult beetles.

WESTERN BALSAM BARK BEETLE

A Regional increase in subalpine fir mortality, attributable to western balsam bark beetle, was recorded in 1990. Most of that increase, however, was on the Beaverhead NF in southwestern Montana. There, approximately 3,200 trees had been killed on 5,200 acres. Throughout the remainder of the Region, only light and scattered mortality was observed. Though subalpine mortality has long been attributed to western balsam bark beetles, we believe much of this damage is caused by a complex of pests, including root diseases.

SPRUCE BEETLE

Regional spruce beetle activity remained endemic except for one small infestation on the southern portion of the Nez Perce NF, in the Hells Canyon Recreation Area. That infestation, totalling 585 acres, and 795 trees, is likely an expansion of a serious spruce beetle outbreak on the Payette National Forest (Intermountain Region) just to the south. Elsewhere, very little spruce beetle activity was recorded.

ACKNOWLEDGEMENTS

Once again, we collectively thank those who contributed much time and effort in compiling the data on which this report is based. Without the assistance of aerial observers, ground surveyors, data managers, typists and many others, our attempts to disseminate information regarding bark beetle conditions would be futile. Our appreciation is extended to all.

APPENDIX

SCIENTIFIC NAMES

Beetles

Mountain pine beetle	*Dendroctonus ponderosae* Hopkins
Douglas-fir beetle	*Dendroctonus pseudotsugae* Hopkins
Pine engraver	*Ips pini* Say
Fir engraver	*Scolytus ventralis* LeConte
Western pine beetle	*Dendroctonus brevicomis* LeConte
Spruce beetle	*Dendroctonus rufipennis (Kirby)*
Western balsam bark beetle	*Dryocoetes confusus* Swaine

Hosts

Lodgepole pine	*Pinus contorta* var. *latifolia* Englemann
Ponderosa pine	*Pinus ponderosa* Laws
Western white pine	*Pinus monticola* Douglas
Whitebark pine	*Pinus albicaulis* Engelmann
Limber pine	*Pinus felxilis* James
Douglas-fir	*Pseudotsuga menziesii* var. *glauca* (Beissn.) Franco
Grand fir	*Abies grandis* (Douglas) Lindl.
Subalpine fir	*Abies lasiocarpa* (Hook.) Nutt.
Engelmann spruce	*Picea engelmannii* Parry

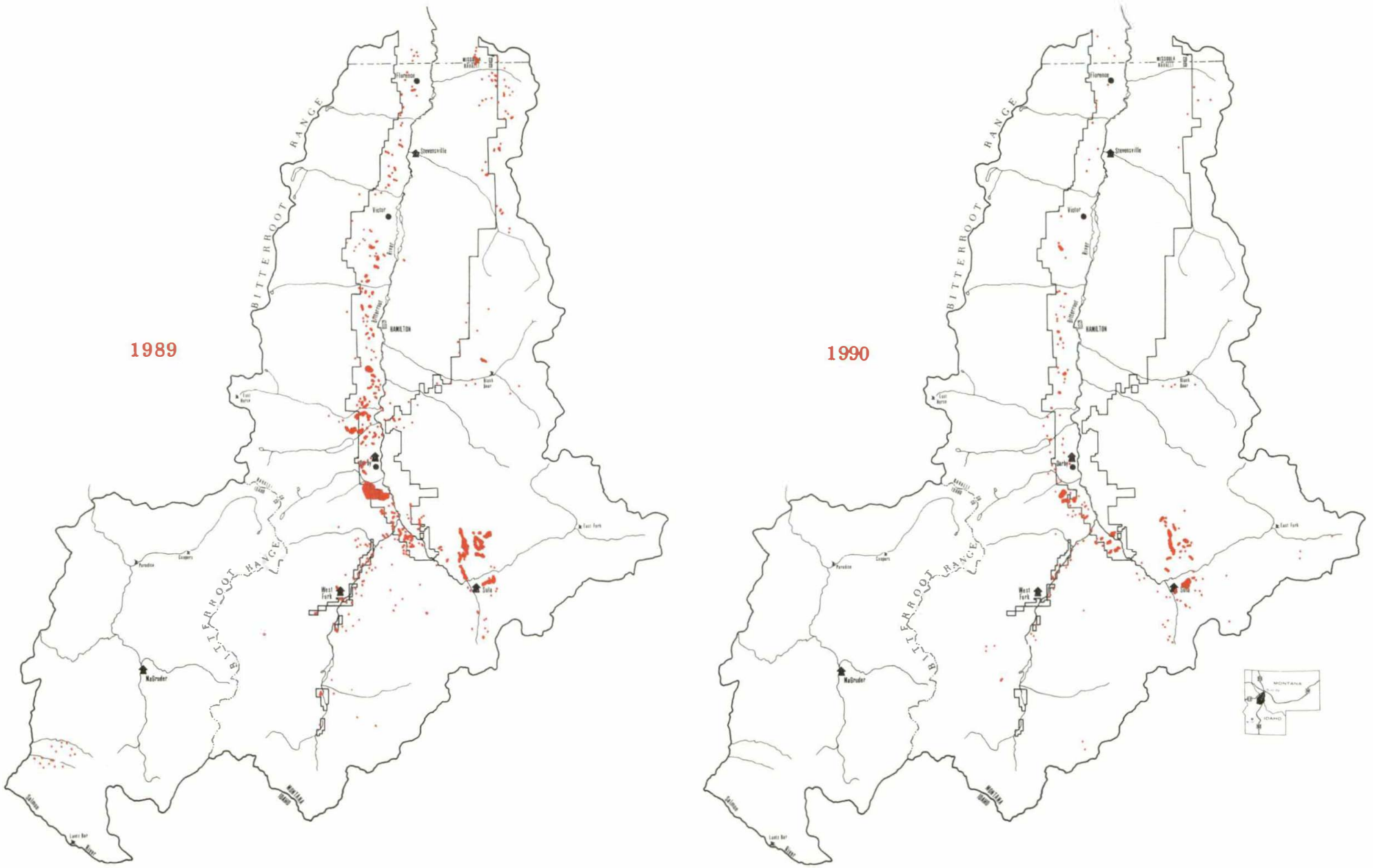

Figure 1.--Areas of pines infested by mountain pine beetle, Bitterroot National Forest area, Idaho and Montana.

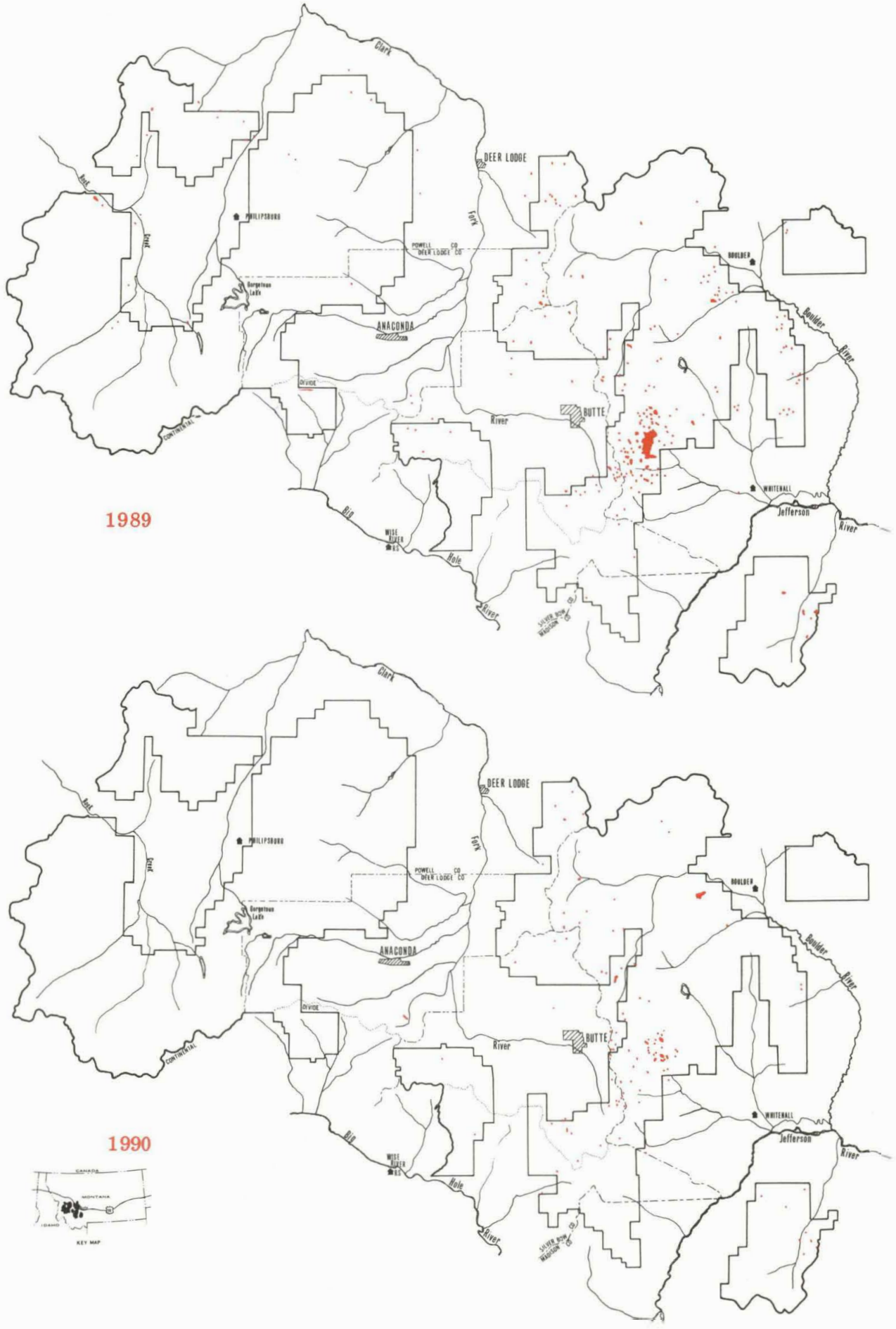

Figure 2.--Areas of pines infested by mountain pine beetle, Deerlodge National Forest area, Montana.

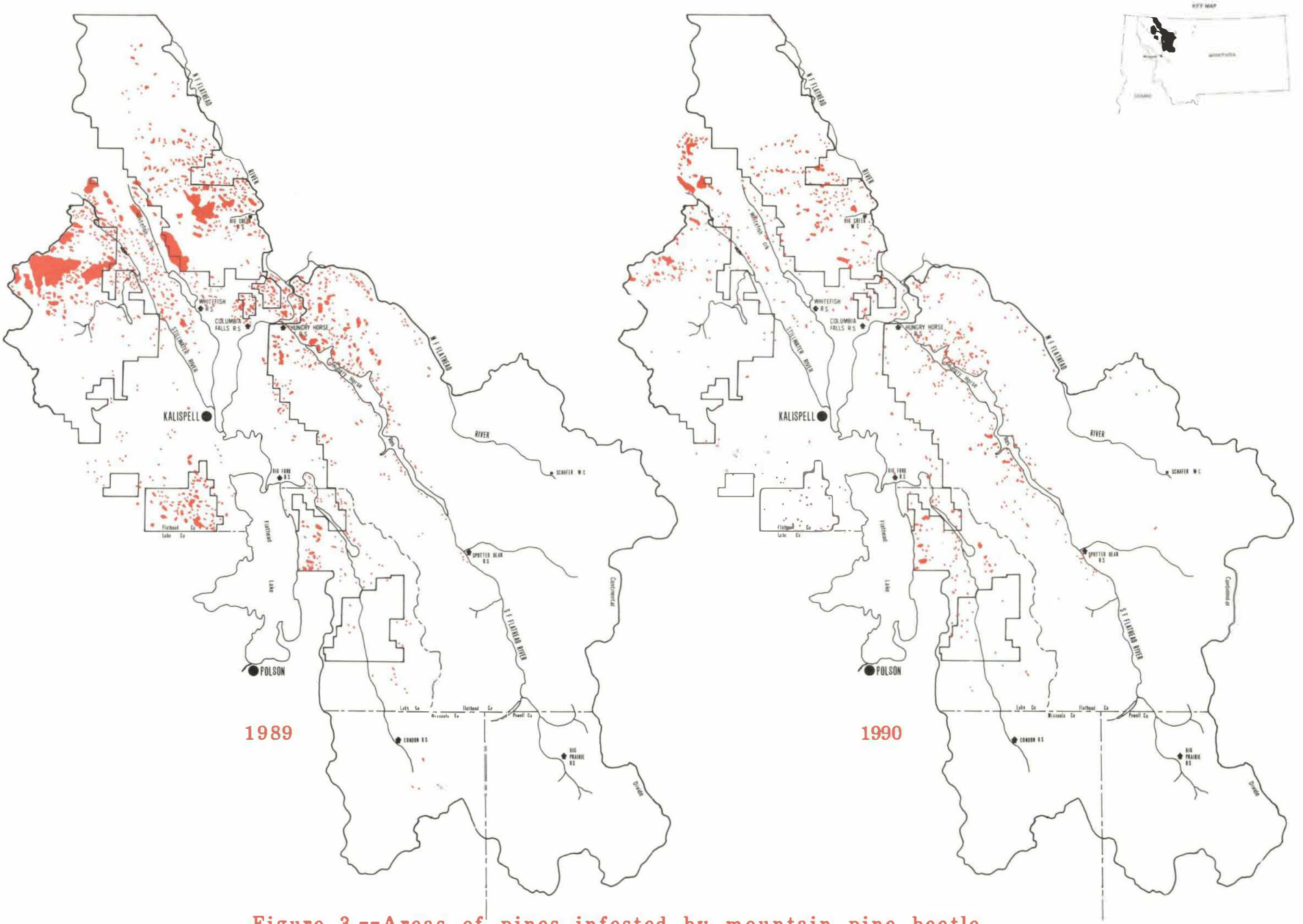

Figure 3.--Areas of pines infested by mountain pine beetle, Flathead National Forest area, Montana.

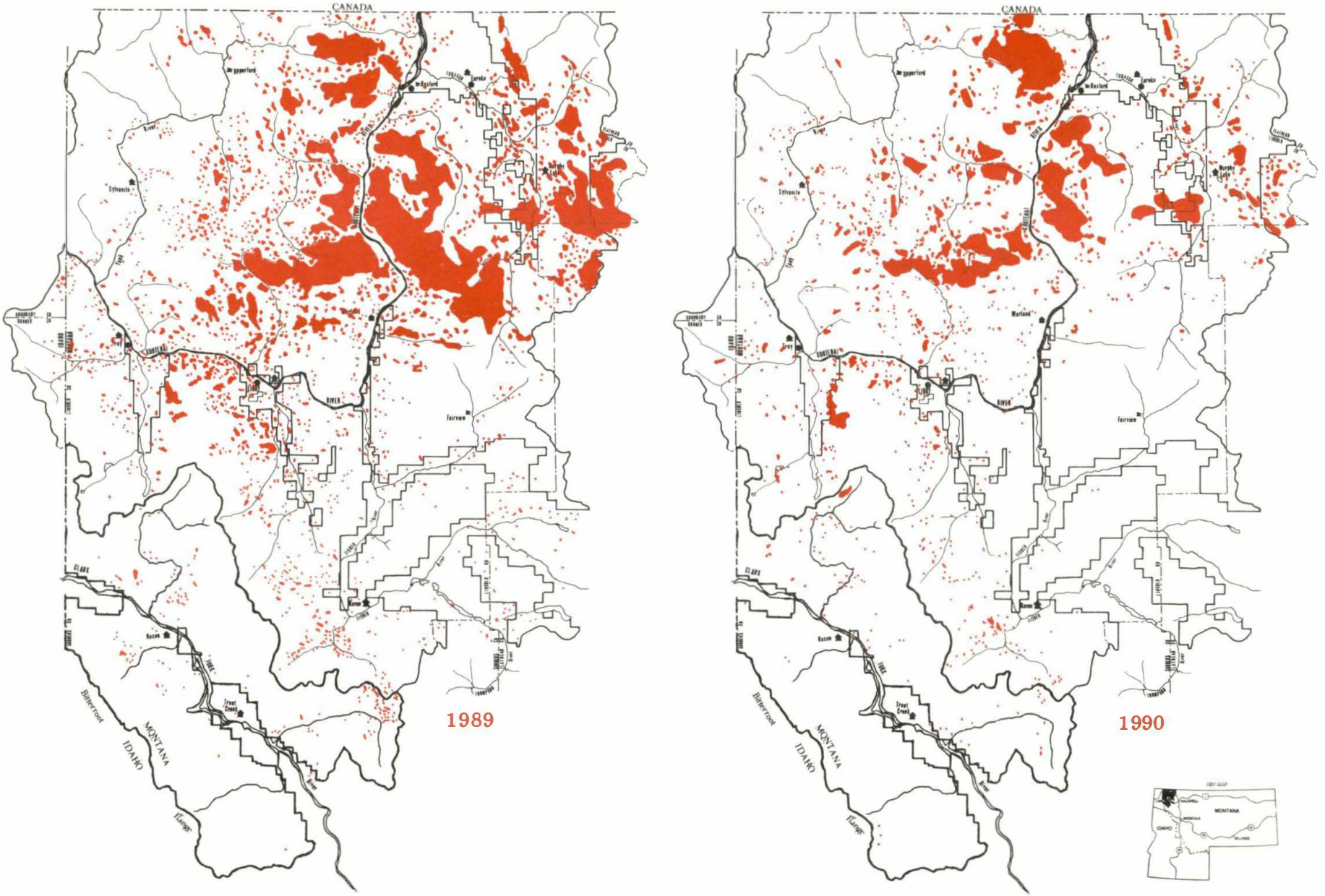

Figure 4.--Areas of pines infested by mountain pine beetle, Kootenai National Forest area, Montana.

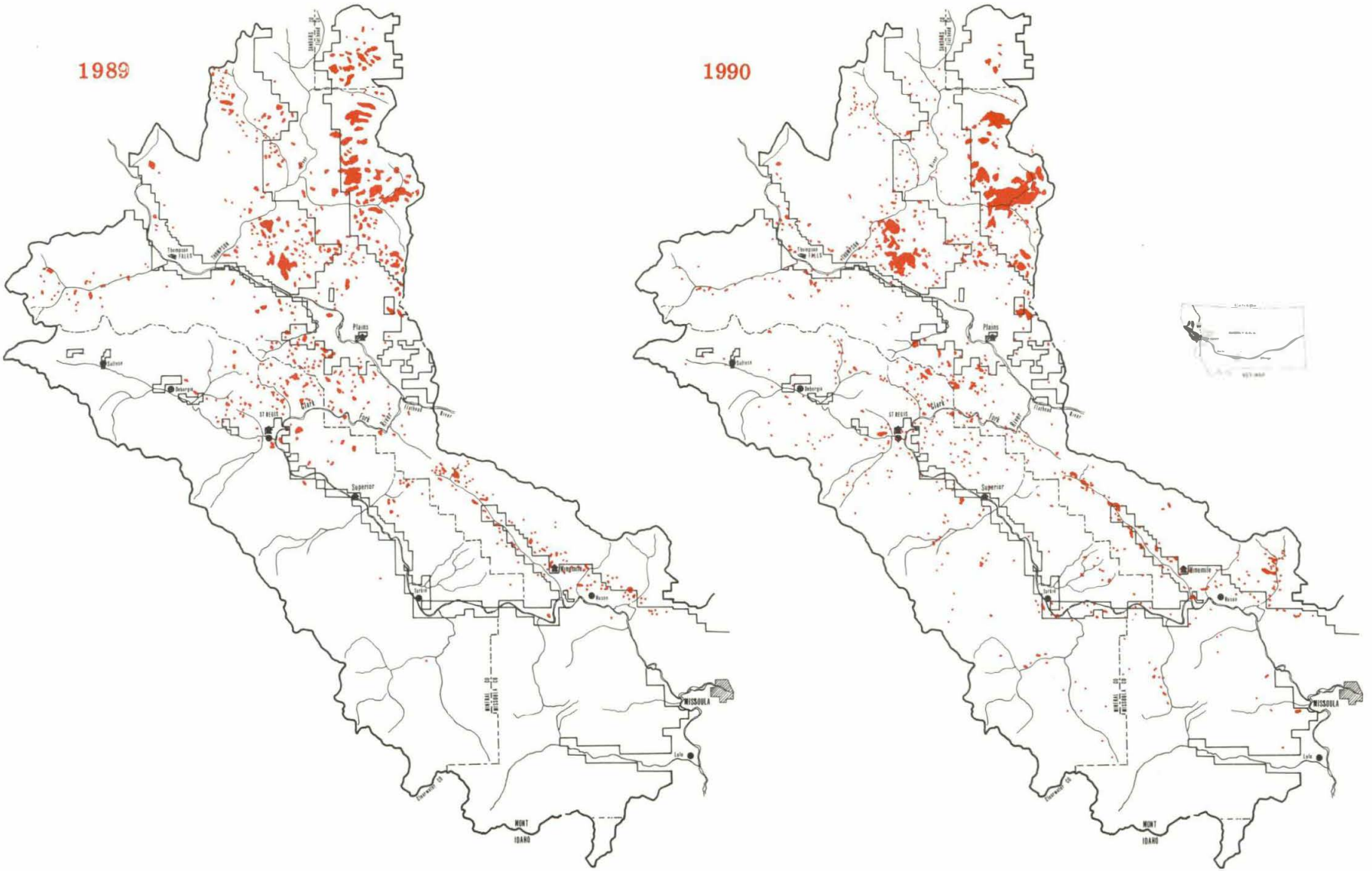

Figure 5.--Areas of pines infested by mountain pine beetle, Lolo National Forest area(west half), Mountana.

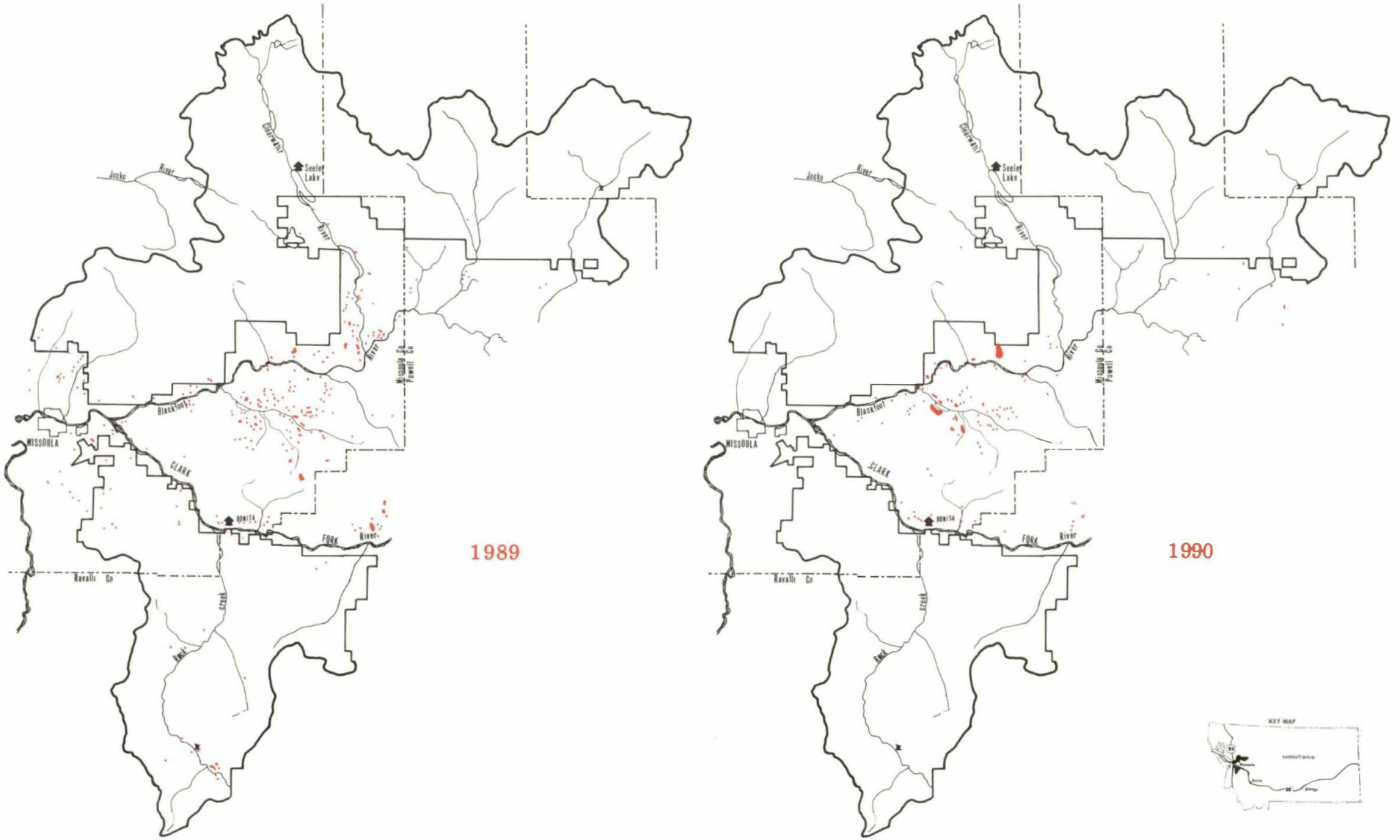

Figure 6.--Areas of pines infested by mountain pine beetle, Lolo National Forest area(east half), Montana.

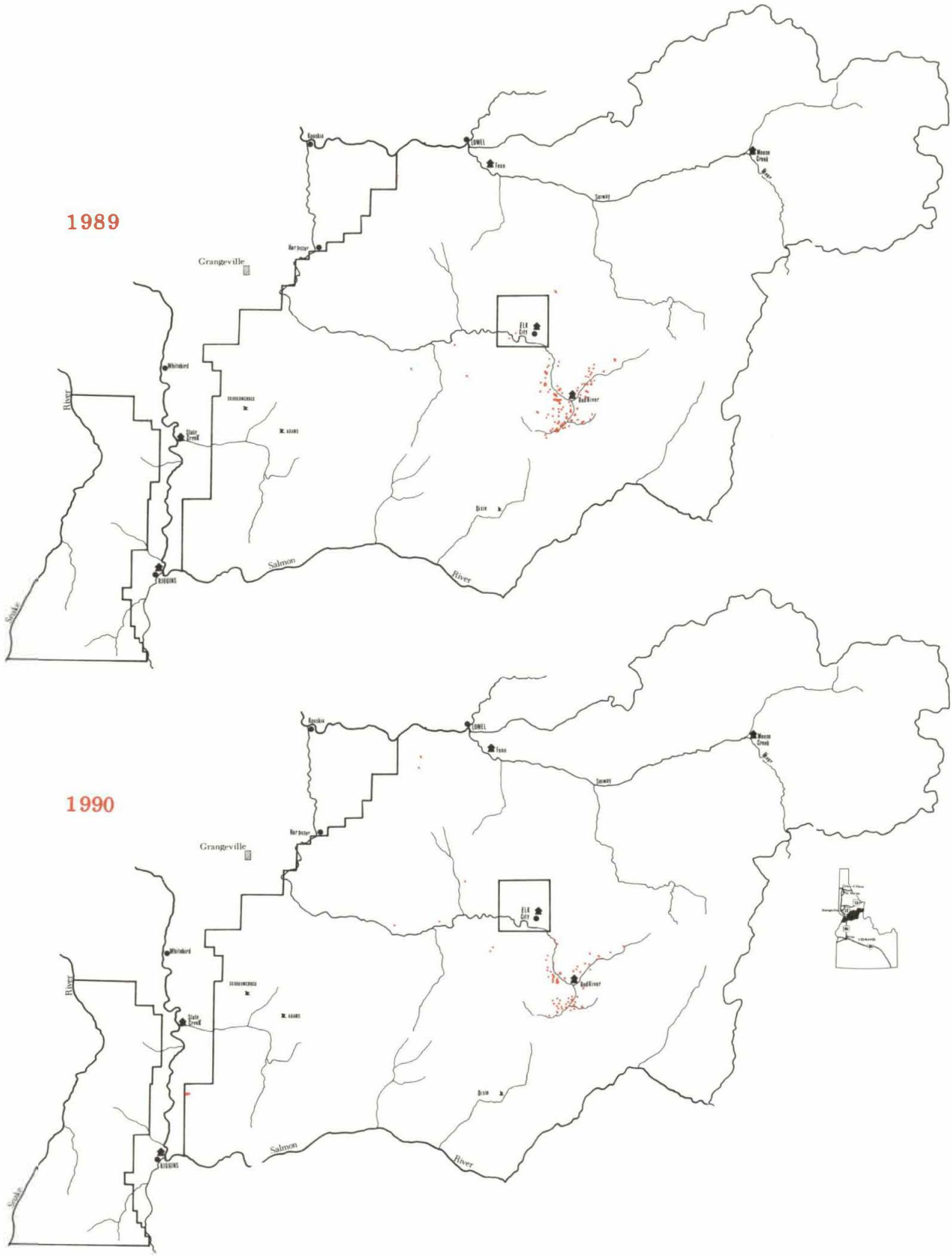

Figure 7.--Areas of pines infested by mountain pine beetle, Nezperce National Forest area, Idaho.

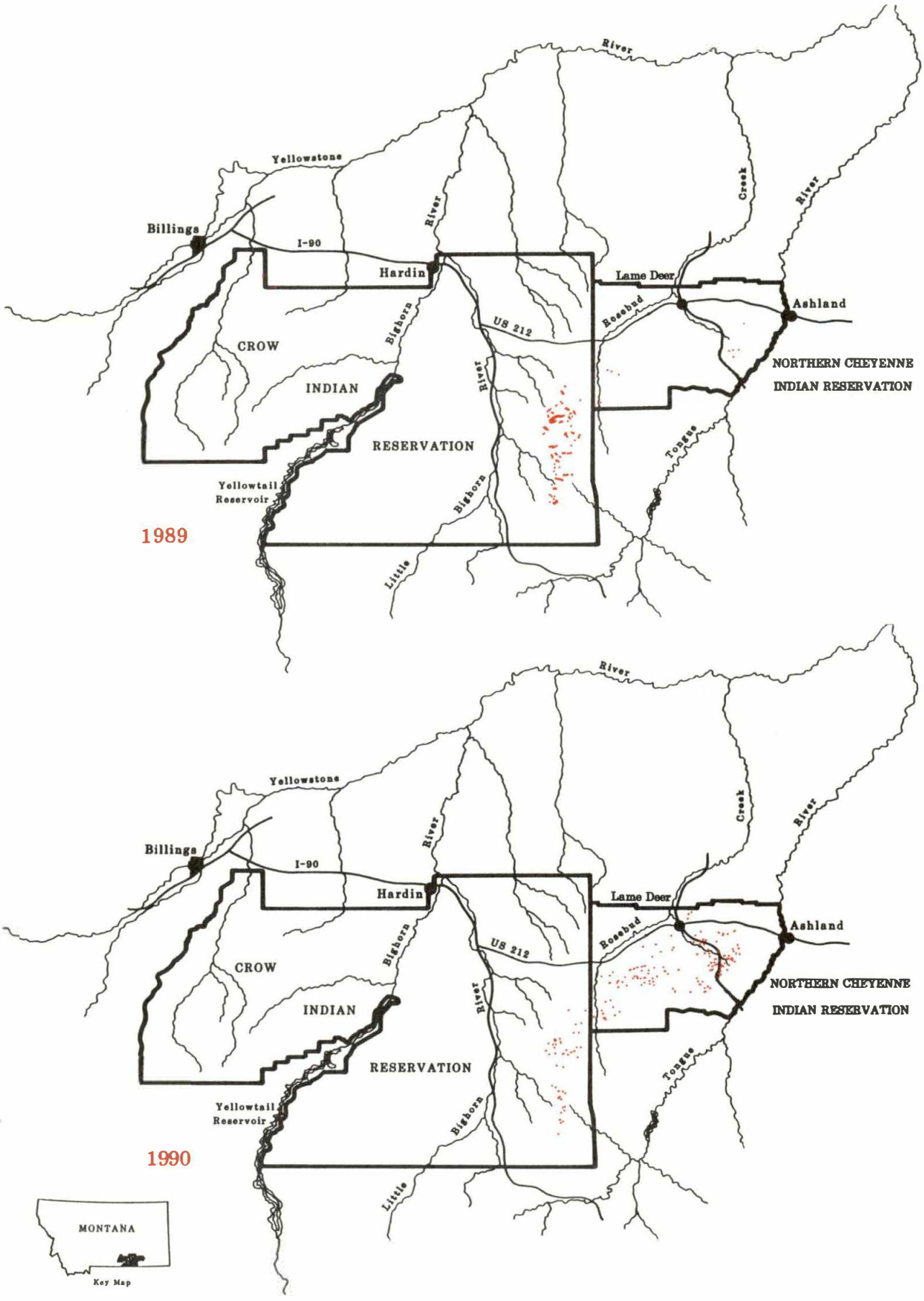

Figure 8.--Areas of pines infested by mountain pine beetle, Crow Indian Reservation, and Ips beetle, Northern Cheyenne Indian Reservation, Montana.

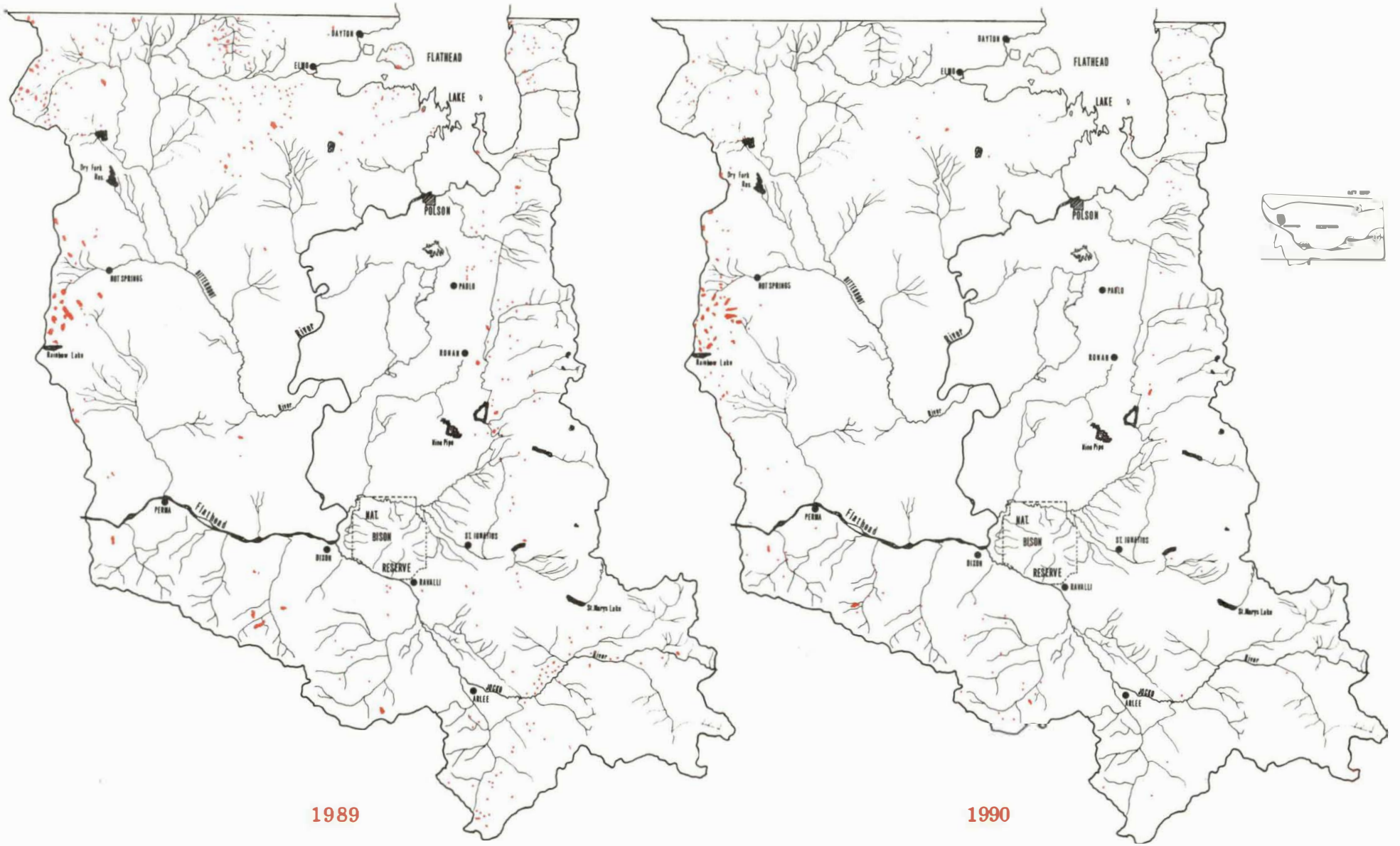

Figure 9.--Areas of pines infested by mountain pine beetle, Flathead Indian Reservation, Montana.

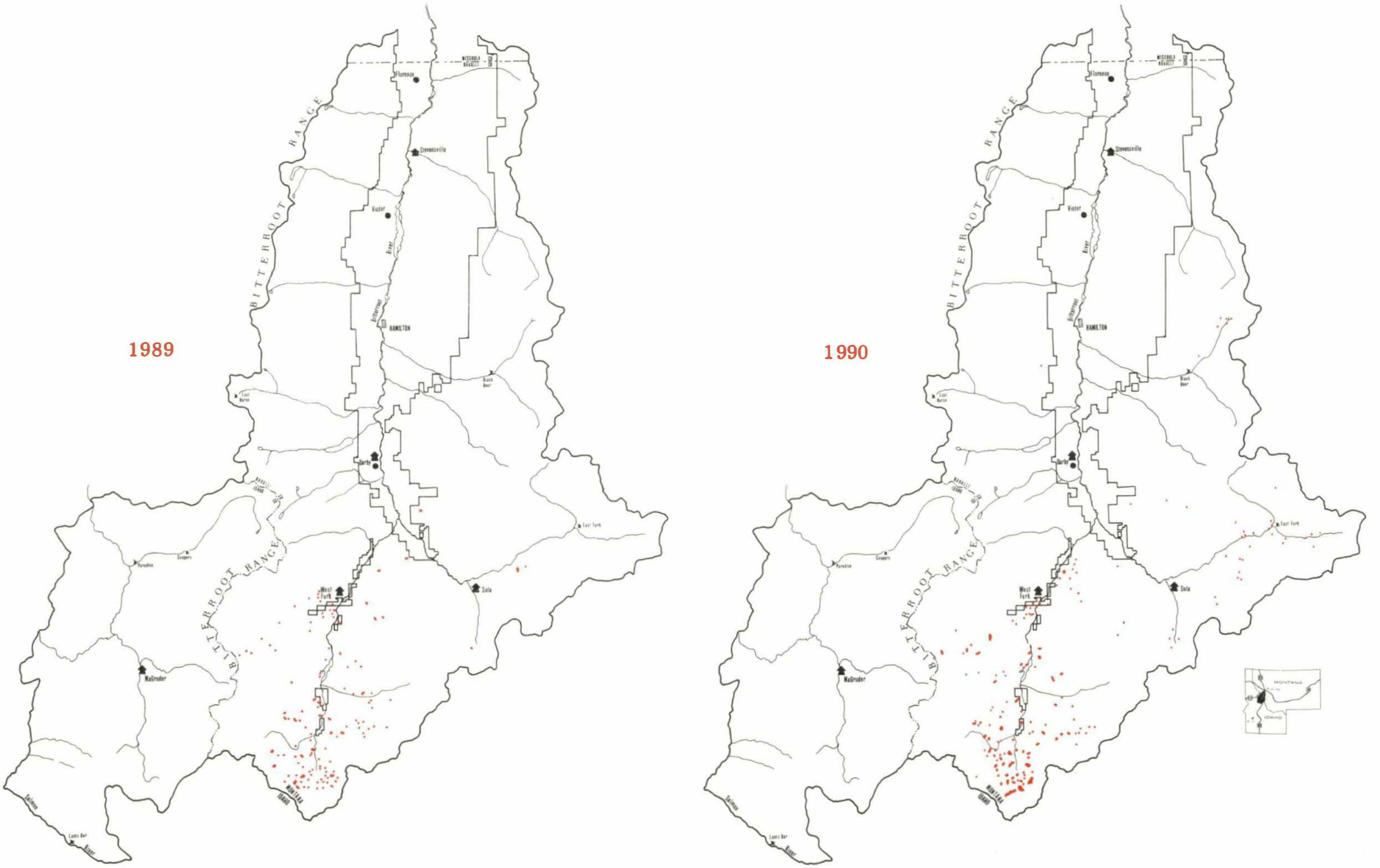

Figure 10.--Areas of Douglas-fir infested by Douglas-fir beetle, Bitterroot National Forest area, Idaho and Montana.

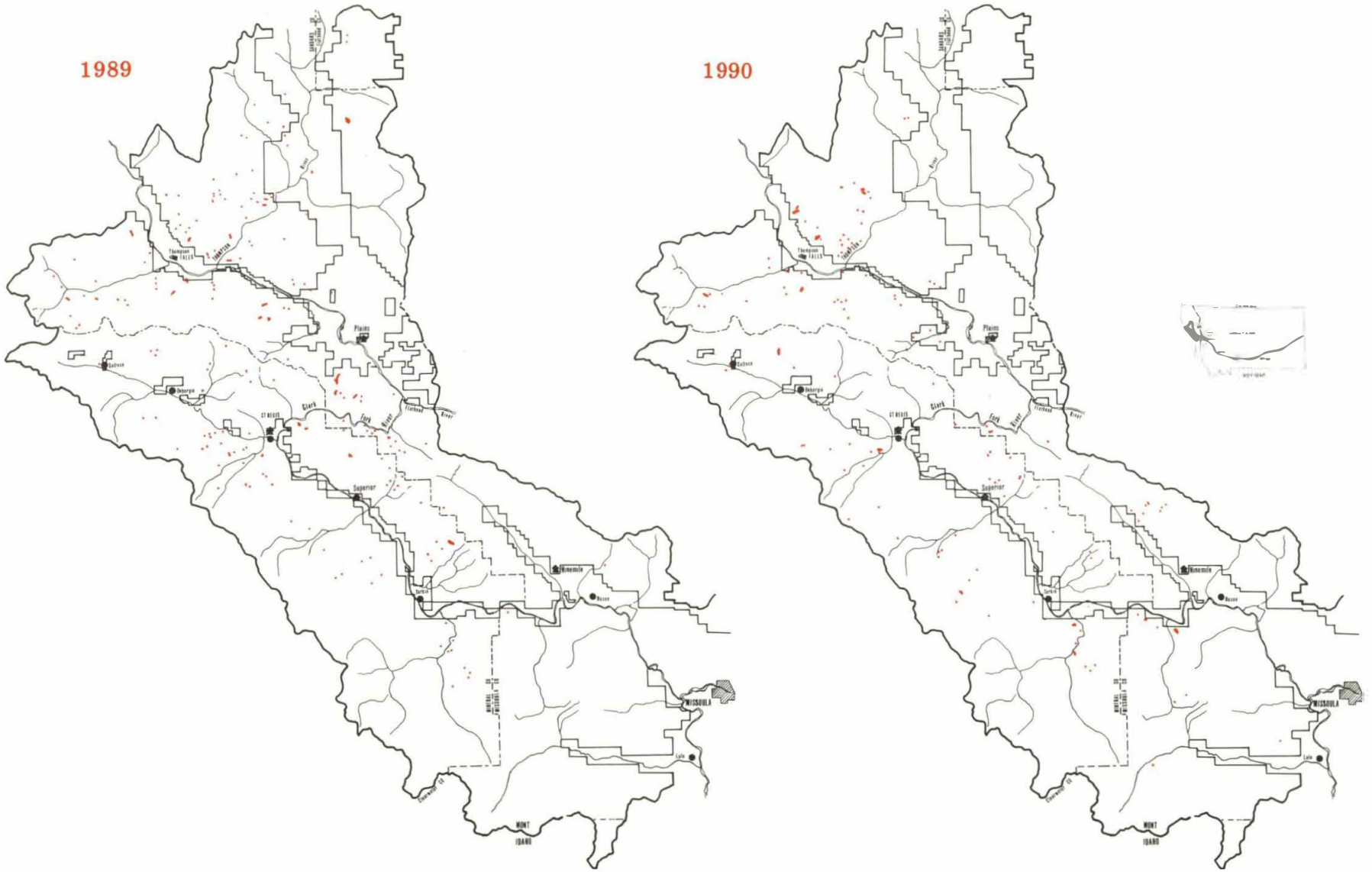

Figure 11.--Areas of Douglas-fir infested by Douglas-fir beetle, Lolo National Forest area(west half), Montana.

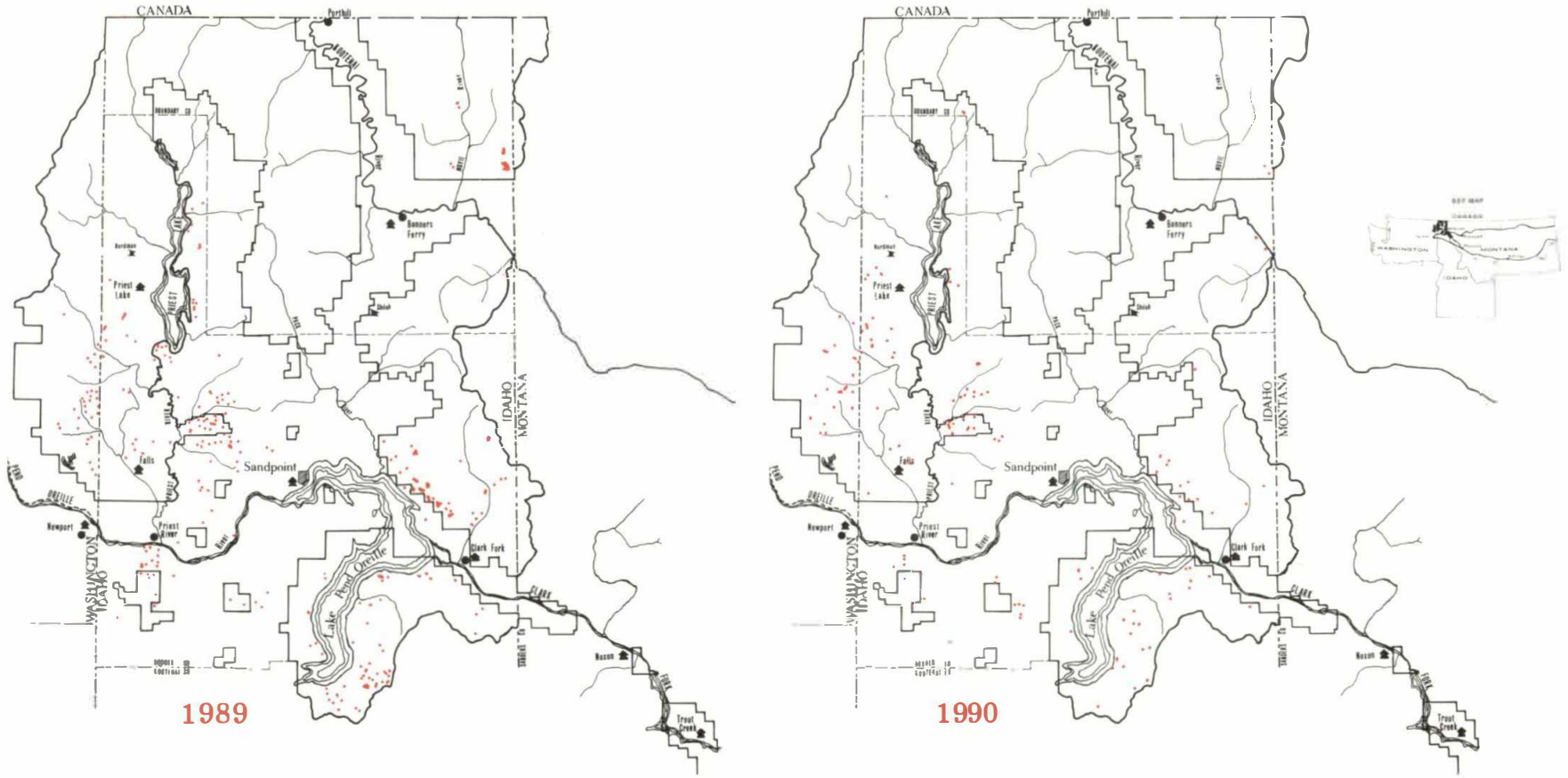

Figure 12.--Areas of Douglas-fir infested by Douglas-fir beetle, Idaho Panhandle National Forests (Kaniksu NF) area, Idaho.

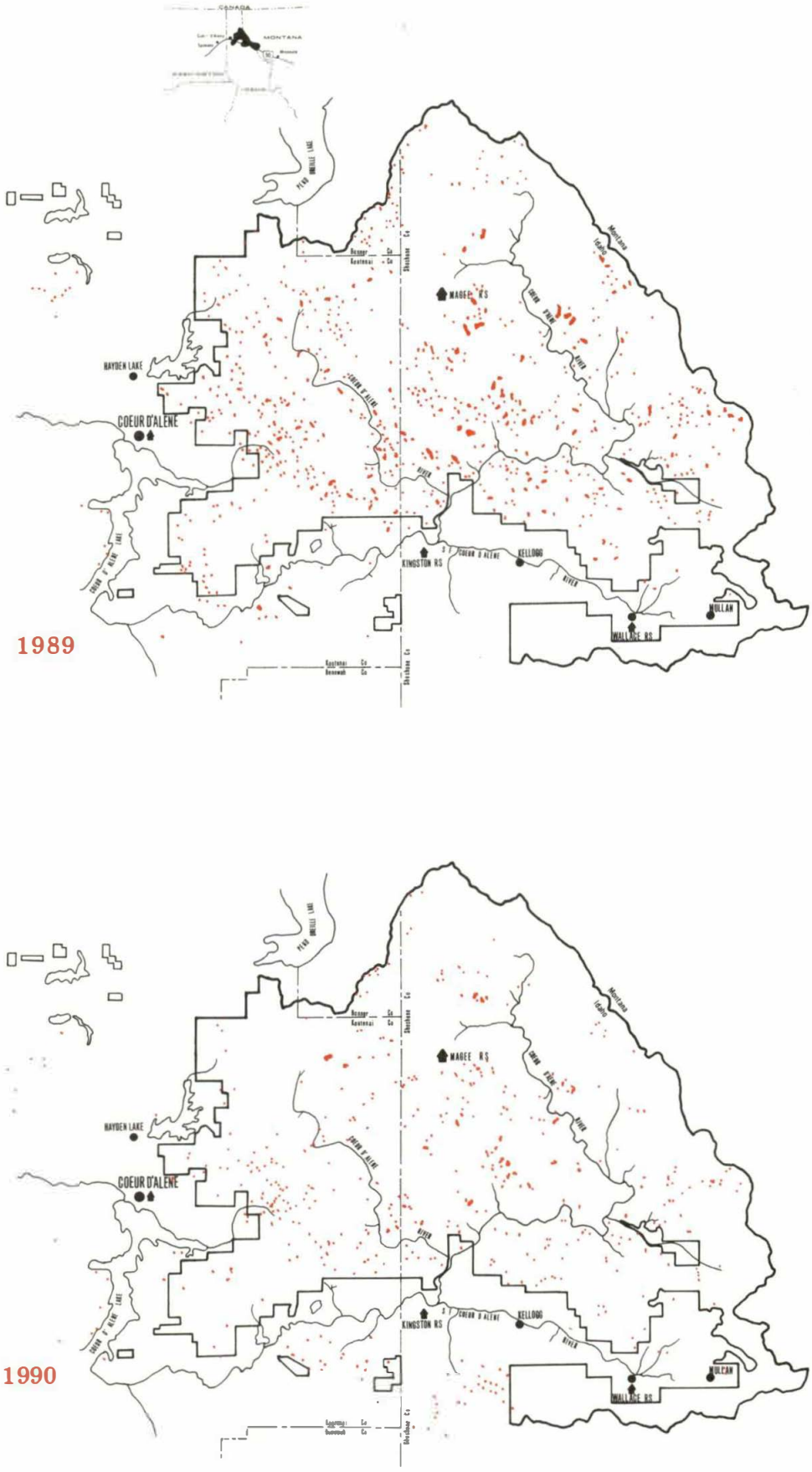

Figure 13.--Areas of Douglas-fir infested by Douglas-fir beetle, Idaho Panhandle National Forests (Coeur d'Alene NF) area, Idaho.

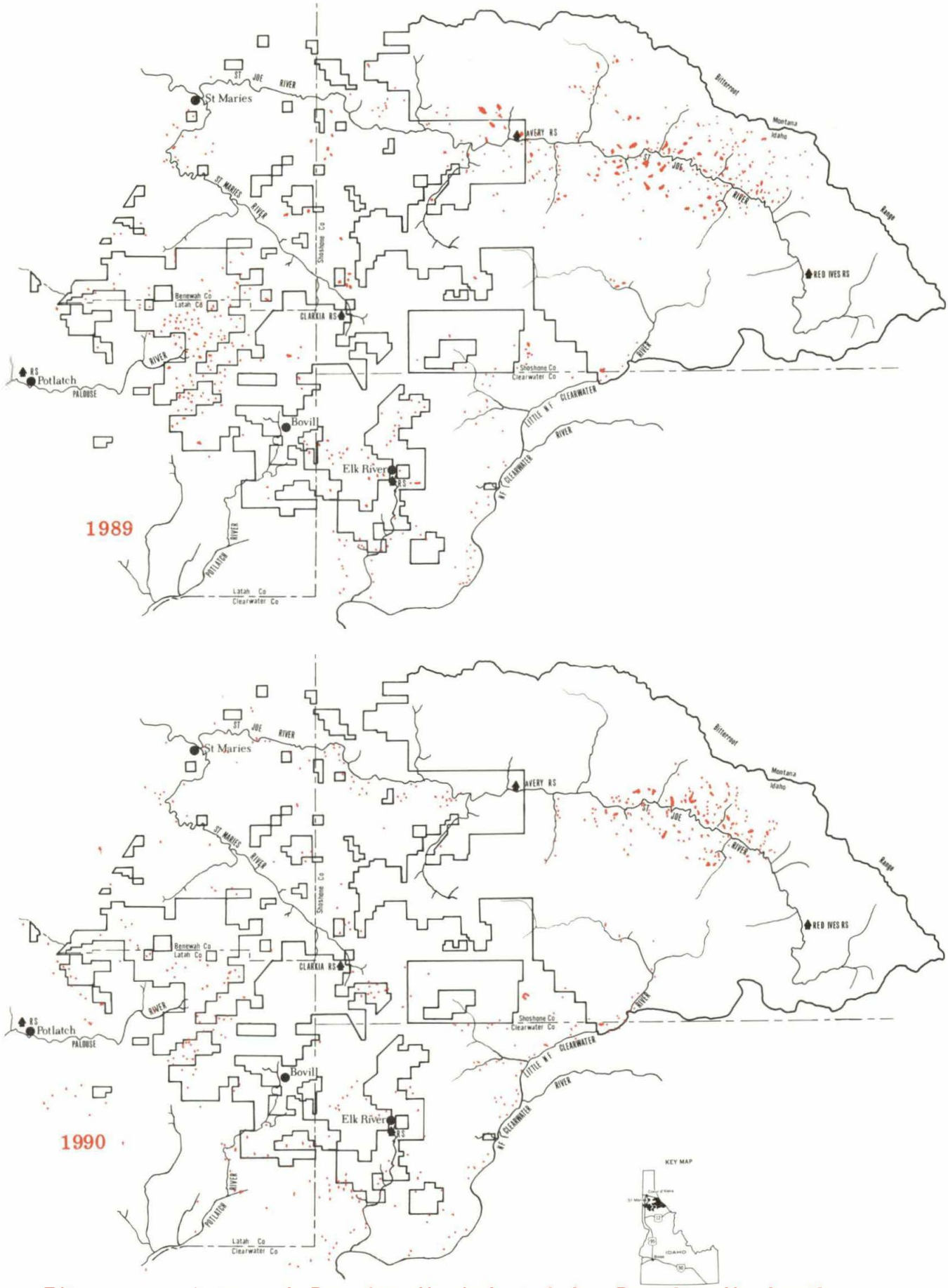

Figure 14.--Areas of Douglas-fir infested by Douglas-fir beetle, Idaho Panhandle National Forests (St. Joe NF) area, Idaho.

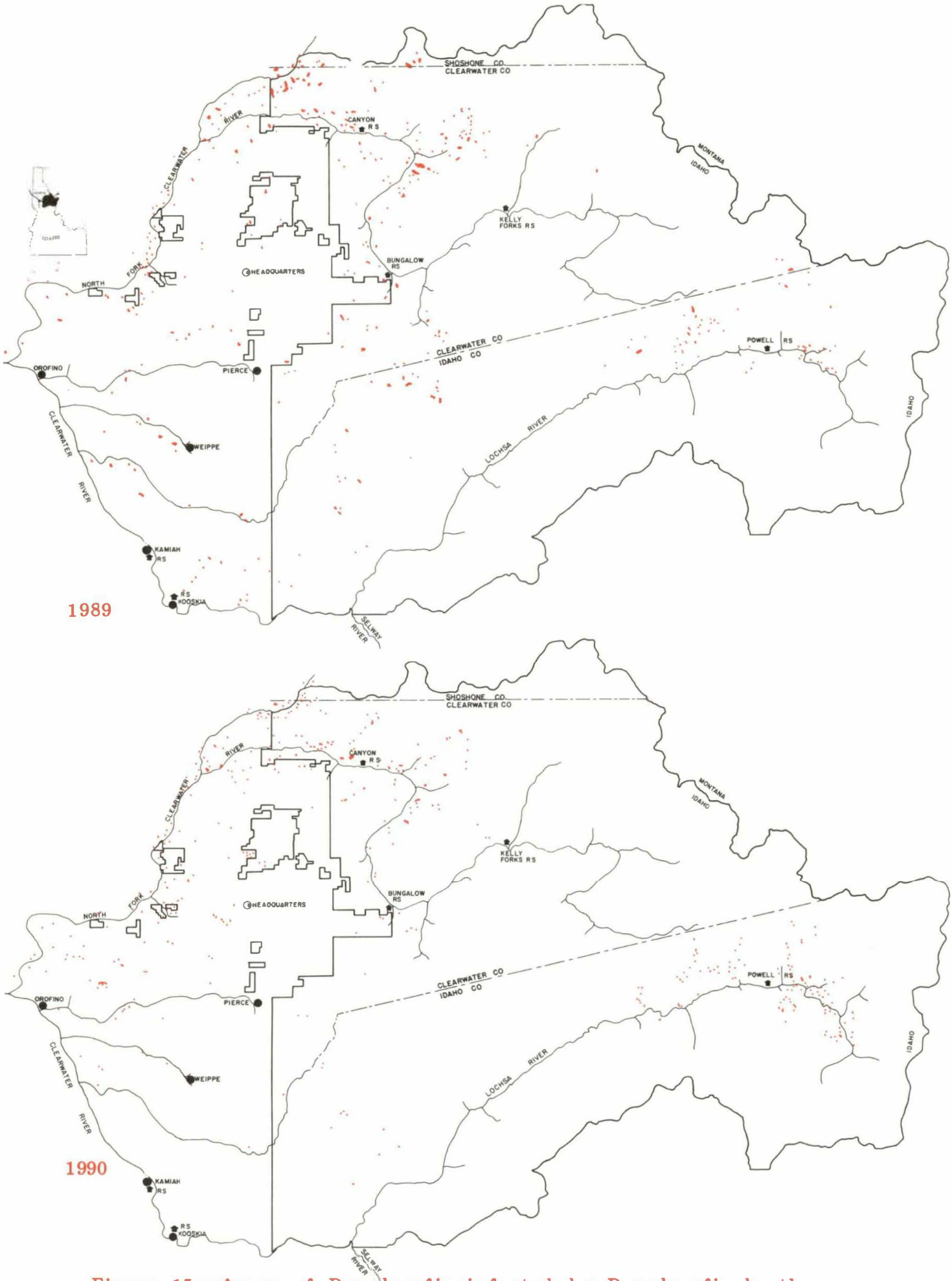

Figure 15.--Areas of Douglas-fir infested by Douglas-fir beetle, Clearwater National Forest area, Idaho.

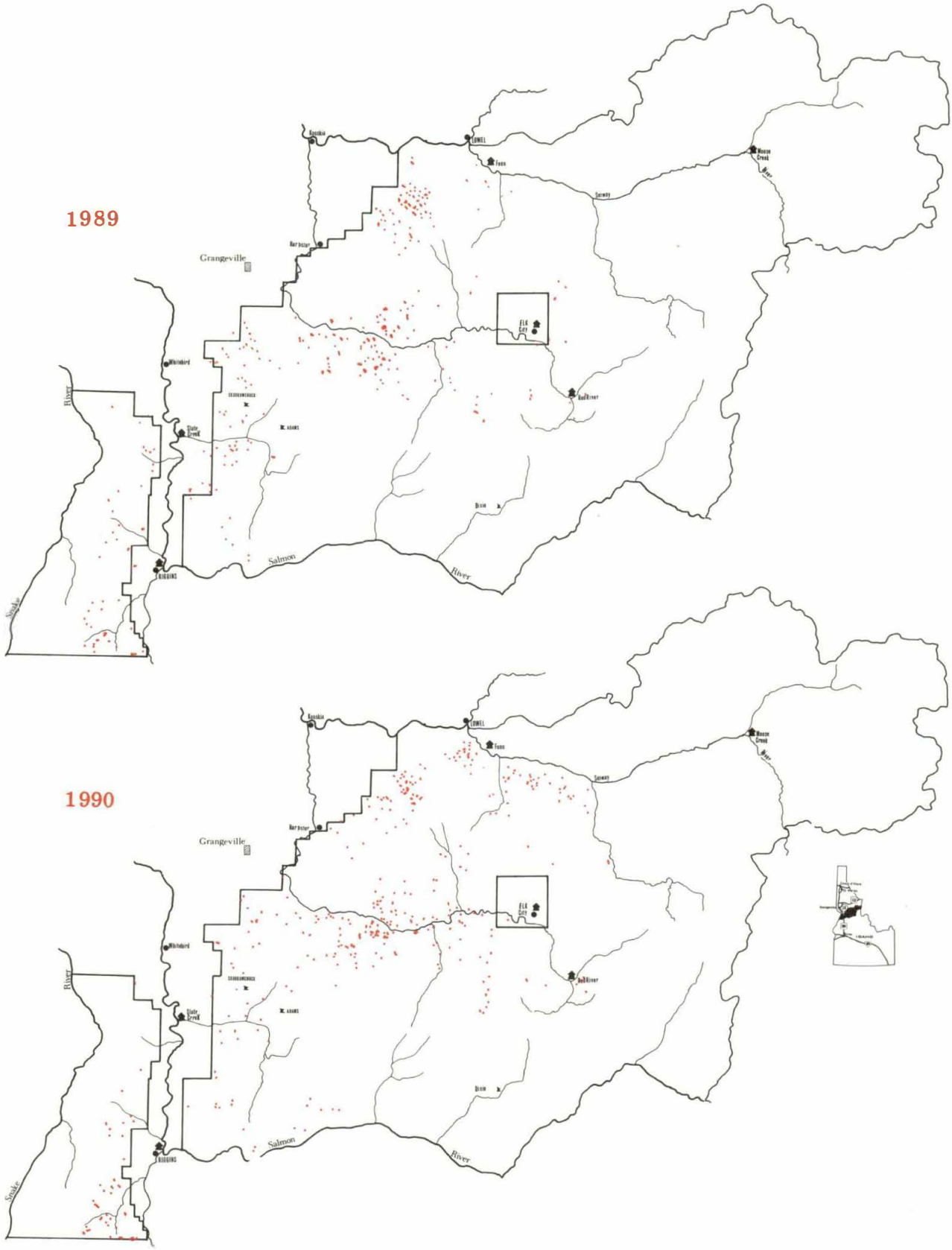

Figure 16.--Areas of Douglas-fir infested by Douglas-fir beetle, Nezperce National Forest area, Idaho.

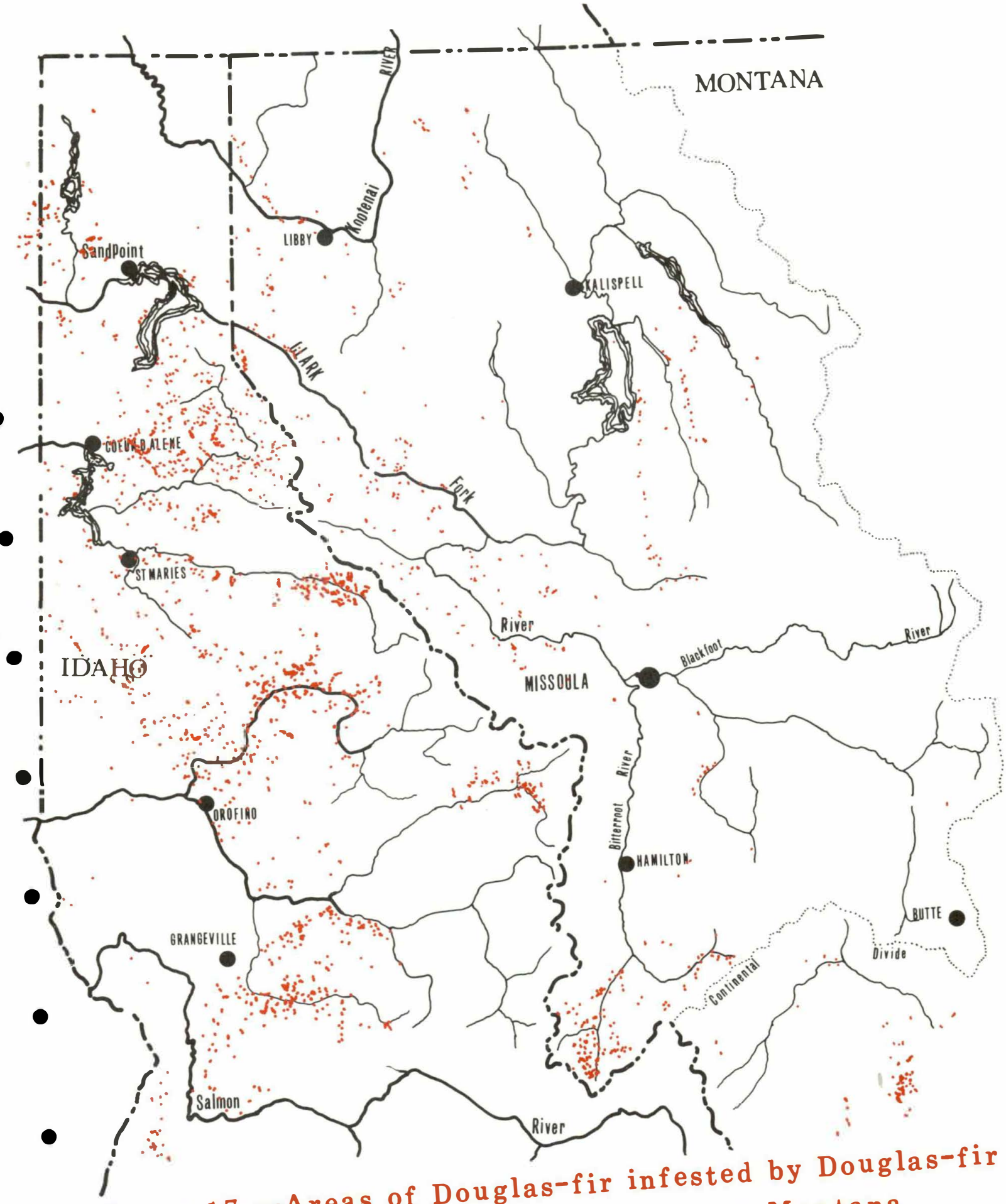

Figure 17.--Areas of Douglas-fir infested by Douglas-fir beetle, northern Idaho and western Montana.

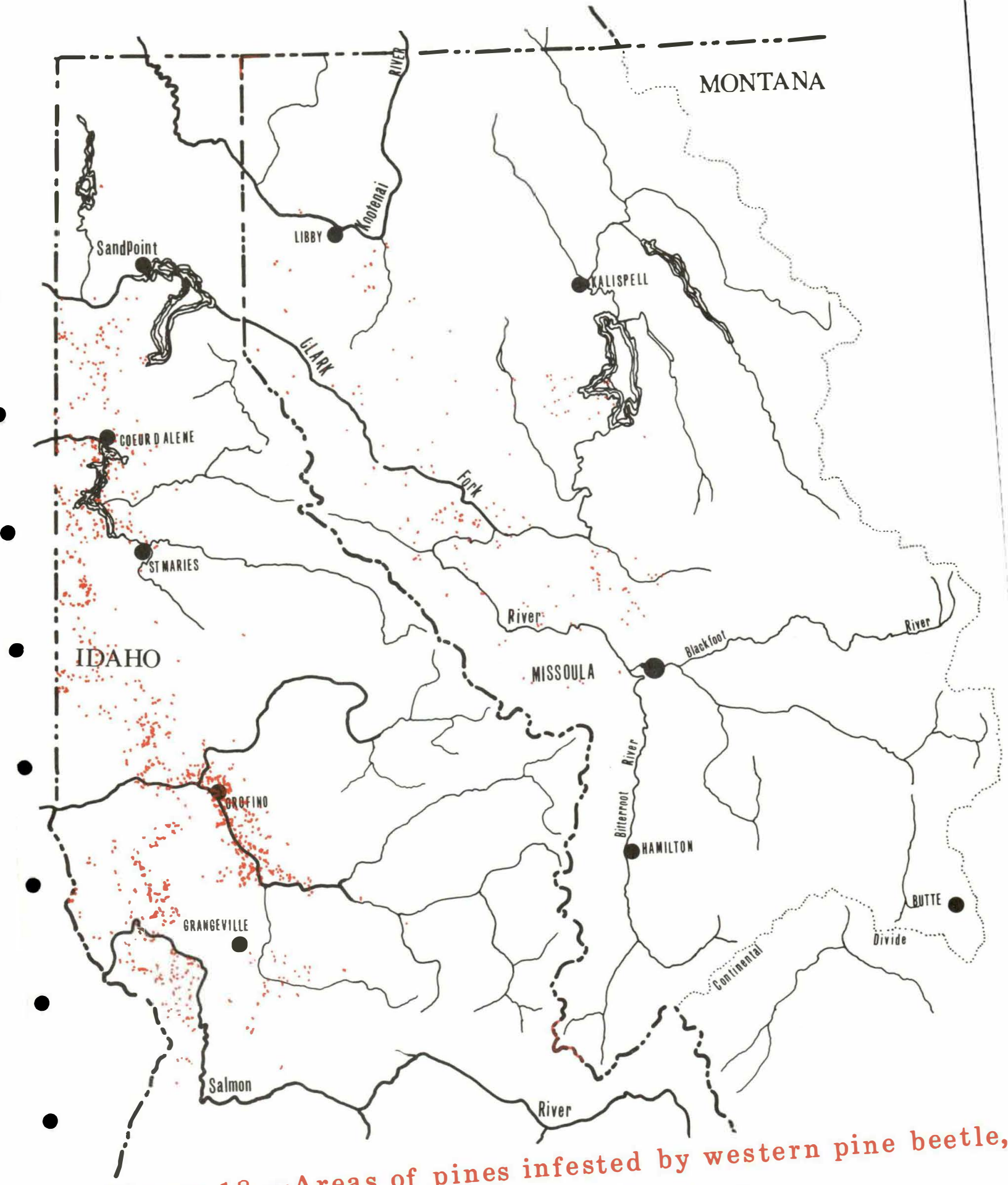

Figure 18.--Areas of pines infested by western pine beetle, northern Idaho and western Montana.

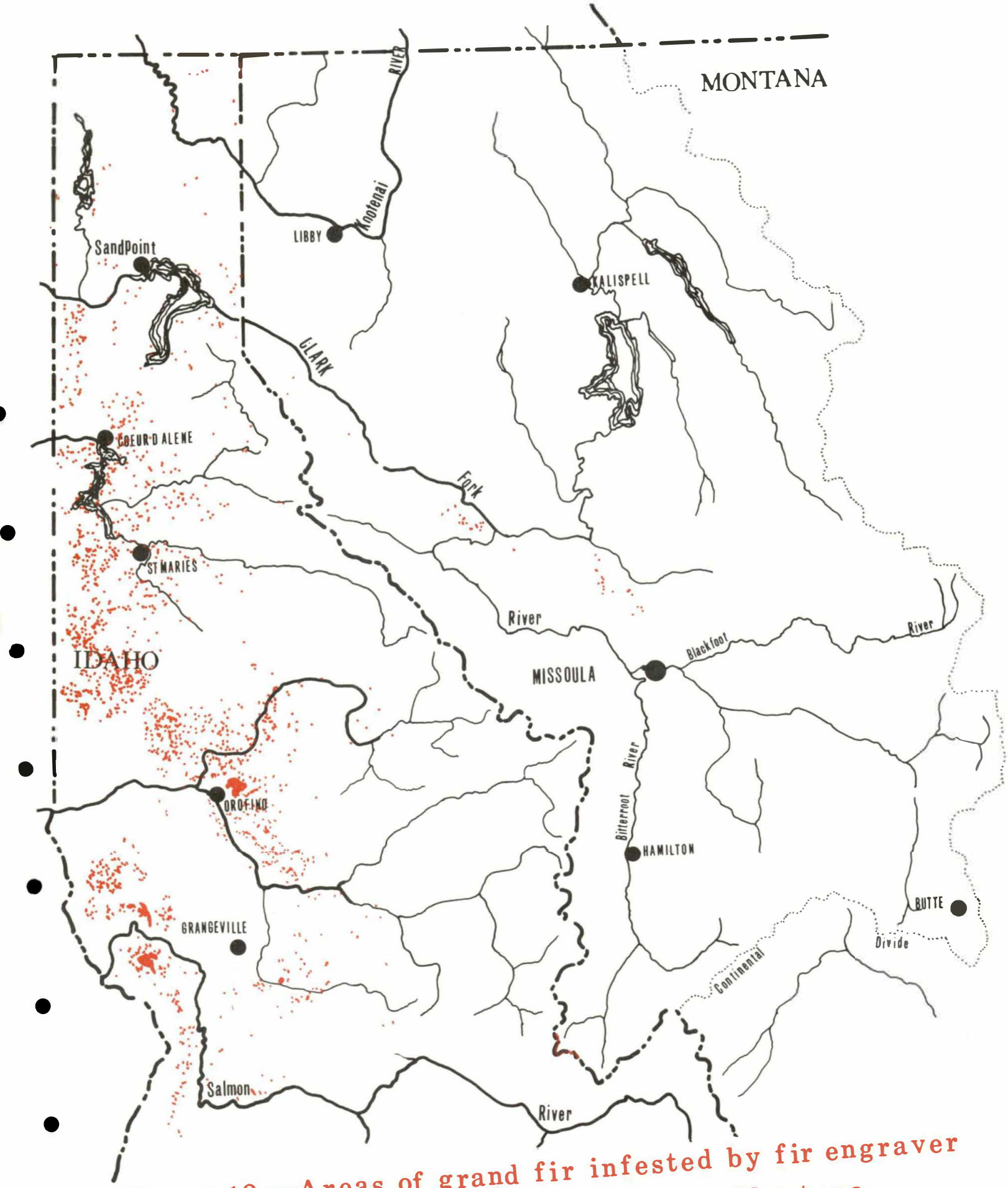

Figure 19.--Areas of grand fir infested by fir engraver beetle, northern Idaho and western Montana.